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ABSTRACT

The author has attempted to assess attitude change of elementary teachers toward career education, industrial arts, and vocational education due to participation in implementation of new instructional units in the Mesa (Arizona) Public Schools. A stratified random sampling technique was used to select experimental and control groups of 100 subjects each. Pretesting of all participating teachers was done before the Comprehensive Career Education Model units were implemented and posttesting was done at the end of the 1972-73 school year. To measure connotative meanings of the three concepts, thirteen semantic differential bipolar scales were developed using factorial composition, relevance, and semantic stability. From the thirteen scalar scores three factor scores and a total concept score were obtained by simple addition and rated for evaluative potency and activity directional reactions. Positive changes in the potency, activity, and total concept scores for industrial arts accompanied participation in the units. There is evidence that all three concepts were viewed more positively by teachers involved in career education activities, that career education and industrial arts were viewed more positively by male than female teachers, and that industrial arts were viewed more positively by intermediated than primary teachers. (MS)

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CAREER EDUCATION, INDUSTRIAL ARTS, AND VOCATIONAL EDUCATION--A SEMANTIC-DIFFERENTIAL STUDY

by

William Frank Smith

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ABSTRACT

The ACCE '72 (Attitude Change--Career Education, 1972) study assessed semantic-differential meaning changes concomitant with participation in the implementation of Comprehensive Career Education Model instructional units. The assessment was directed at measuring changes in the semantic-differential meanings of career education, industrial arts, and vocational education exhibited by elementary teachers of the Mesa Public Schools, Mesa, Arizona. The study also attempted to determine if the meanings assigned to career education, industrial arts, and vocational education differed among subgroups of teachers classified within selected demographic data categories.

Four hundred fifty-three elementary teachers employed by the Mesa Public Schools comprised the population of the study. A stratified random sampling technique was used to sample 200 participants. The 453 teachers comprising the population were divided into seven strata according to grade level and an independent sample was drawn from each of the seven strata. The number of teachers selected from each stratum was proportionate to the size of that stratum in the total population. After appropriate strata samples were selected, they were then randomly divided into experimental and control groups. Both comparison groups were composed of 100 subjects.

The criterion instrument developed for use was a form of the semantic-differential technique. Essentially, the instrument was considered to be a combination of association and scaling procedures which measured the connotative meanings of the concepts studied. The test booklet was designed in such a way that each concept appeared at the top of a single page followed by thirteen bipolar scales.

Scales were chosen using (1) factorial composition, (2) relevance, and (3) semantic stability as criteria for selection. Each scale was scored from "one" to "seven" where the high end represented the favorable pole. From the thirteen scalar scores, three factor scores were obtained by simple addition. The total concept score was also obtained and analyzed as a complete measurement of meaning. A respondent's factor ratings represented his evaluative, potency, and activity directional reactions (i.e., good vs. bad) to the concepts, as well as the intensity of these reactions.

All participating teachers completed the semantic-differential instrument before Comprehensive Career Education Model instructional units were implemented. Both experimental and control subjects were posttested at the close of the 1972-73 school year. Data were analyzed by *F* tests (analysis of variance) to ascertain differences between comparison groups. The statistical tests based on related samples, which were applied to the study's pretest-posttest data, were correlated *t* tests. All tests for

significance were reported at the .05 level unless the .01 level was reached.

Positive changes in the potency, activity and total concept scores of industrial arts accompanied participation in implementation of career education instructional units. Experimental teachers of the ACCE '72 study judged the concept industrial arts as being more potent than did control subjects. There was evidence, although not statistically significant, that those teachers who became involved in career education activities tended to view all three concepts more positively. The inquiry also revealed that male subjects viewed career education and industrial arts more positively than female subjects. It was also found that intermediate teachers viewed industrial arts more favorably than primary teachers.

The results and conclusions of the ACCE '72 study hold implications for further research concerning the concepts studied as well as the semantic-differential technique of measuring meaning.

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CHAPTER I

GENERAL NATURE AND PURPOSE OF THE STUDY

The term career education was coined as a label for the fusion of general education and vocational education. With the impetus provided by President Nixon and Sidney Marland, Assistant Secretary for Education, career education has become an imposing educational thrust.

The concept of career education is still evolving, and as with all infant concepts, experience and experimentation will assist in molding its shape. Career education is a fresh concept, yet in one sense, there is nothing new about it; many of its elements have been discussed, promoted, and practiced over several decades. Industrial arts and vocational education are concepts that are rich with historical antecedents and both are elements of career education. Our educational past has seen industrial arts and vocational education become identifiable as separate concepts, which exemplifies the separation of general and vocational education. It is the intent of career education to bridge this existing gap. Since industrial arts and vocational education are integral parts of career education, as well as being identifiable as separate concepts, it seemed plausible that meanings assigned to these concepts would affect the evolution of career education, and vice versa.

Research projects studying the relationship of existing concepts and career education seemed necessary. Although career education was not a vested concept, it was possible to proceed with studies concerning the concept since it was operationally meaningful. The study described in the following pages examined the coexistence of involvement[1] in career education and changes in the semantic-differential[2] meanings of the concepts of career education, industrial arts, and vocational education.

PURPOSES OF THE STUDY

The following objectives describe the general nature and purpose of the study:

1. To assess changes in semantic-differential meanings of the concepts of career education, vocational education, and industrial arts, exhibited by both a subgroup of teachers who were involved in career education during the 1972-73 school year (experimental group) and a subgroup of teachers who were not involved (control group).

2. To determine if meanings assigned to the concepts of career education, vocational education, and industrial arts by a

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[1]For the purposes of this study, involvement in career education was defined as participation in the implementation of instructional units as well as the inservice training accompanying that implementation. Those teachers that became involved were defined as the experimental group.

[2]For an example of a semantic-differential data-gathering instrument, refer to Appendix A. See the definitions section of this chapter for further information.

subgroup of teachers who were involved in career education during the 1972-73 school year differed from the meanings assigned to the same concepts by a subgroup of teachers who were not involved in career education.

3. To determine if meanings assigned to the concepts of career education, vocational education, and industrial arts differed among subgroups of teachers classified within selected demographic data categories.[3]

QUESTIONS AND HYPOTHESES

More specifically, a series of questions were examined. These questions were broken into component parts, and hypotheses concerning each question were made statistically operational, which further determined the evaluative structure of the investigation.

Question #1 and the resultant hypotheses were included in an attempt to verify the equivalency of the original groups in order to provide a statistical baseline for the succeeding questions and hypotheses.

Question 1: What differences in semantic-differential meanings of selected concepts exist between the original experimental and control groups?

What differences exist between the evaluative, potency, and activity pretest ratings of the experimental and control groups?

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[3]Objective 3 is an adjunct objective and was proposed as a supplement to the primary purposes of the study.

What differences exist between the total concept rating of the experimental and control groups?

Hypothesis 1.1. There are no differences between the mean evaluative, potency, and activity concept scores of experimental and control subjects.

Hypothesis 1.2. There are no differences between the mean total concept score of experimental and control subjects.

Question 2: What changes in semantic-differential meanings of selected concepts accompany involvement in career education?

What changes in the evaluative, potency, and activity ratings do involved teachers exhibit toward selected concepts? What changes in total concept ratings do involved teachers exhibit toward selected concepts? What changes in evaluative, potency, and activity ratings do teachers who do not become involved exhibit toward selected concepts? What changes in total concept ratings do teachers who do not become involved exhibit toward selected concepts?

Hypothesis 2.1. There are no differences between the before and after treatment mean evaluative, potency, and activity concept scores of experimental subjects.

Hypothesis 2.2. There are no differences between the before and after treatment mean total concept score of experimental subjects.

Hypothesis 2.3. There are no differences between the pretest and posttest mean evaluative, potency, and activity concept scores of control subjects.

Hypothesis 2.4. There are no differences between the pretest and posttest mean total concept score of control subjects.

Question 3: What differences in semantic-differential meanings exist between teachers who have been involved in career education and teachers who have not been involved?

What differences exist between the evaluative, potency, and activity concept ratings of involved and noninvolved teachers? What differences exist between the total concept ratings of involved and noninvolved teachers?

Hypothesis 3.1. There are no differences between the mean evaluative, potency, and activity concept scores of experimental and control subjects.

Hypothesis 3.2. There are no differences between the mean total concept score of experimental and control subjects.

Question 4: What differences in semantic-differential meanings exist between participating teachers divided among classifications within selected demographic data categories?

Do the total concept pretest ratings of teachers differ among classifications within the following demographic data categories:

1. Sex (Male, Female)

2. Age (Under 30, 30-39, 40-49, 50-59, 60 or over)

3. Teaching Experience (0 yrs., 1, 2, 3, 4, 5-9, 10-14, 15-19, 20 or more)

4. Work Experience (Other than teaching) (0 yrs., 1, 2, 3, 4, 5-9, 10-14, 15-19, 20 or more)

5. Highest Degree Held (Undergraduate, Graduate)

6. Grade Taught (Kgn., 1, 2, 3, 4, 5, 6)

Hypothesis 4.1. There are no differences between the mean total concept score of subjects divided among classifications within selected demographic data categories.

IMPORTANCE OF THE STUDY

The basic idea of career education is to make classroom activity meaningful to all phases of life. It has been suggested that the concept of career education is an effective way to articulate the academic world with the world of work. The underlying assumption is that the present educational system is ineffective in providing this articulation. If we assume that one function of education should be to prepare youth for useful roles in the national economy as well as responsible roles as citizens, the assumption and the concept of career education take on more credibility. However, if education or career education is to fill that role, some educators will have to adopt new attitudes toward some old concepts.

Career education is the most widely discussed issue in education today. Many states have begun efforts to promote career oriented projects, and school systems have employed directors to coordinate the efforts of system personnel in organizing classrooms around the theme(s) of career education. All such efforts are steps in the right direction; however, the largest single effort in career education today is the Comprehensive Career Education Model (CCEM)--Model I (the school-based model). This model is one of four model programs being developed through the efforts of the United States Office of Education. A second model was designed to involve the business community and a third the home. A fourth model, the residential model, was developed to meet the needs of disadvantaged families. These four models, the Comprehensive Career Education Model, represent a national attempt to devise a career education system for virtually all American youth.

The school-based career education model (Model I) was developed by the Ohio State University's Center for Vocational and Technical Education and six school districts from across the nation. The Mesa Public School System, Mesa, Arizona, was one of the six systems that participated. Along with the five other districts, Mesa developed and field tested career education instructional units for elementary grade levels K-6 and all discipline areas within the 7-12 grade levels. The implementation of career education through the medium of instructional units was seen as the most opportune and effectual way of transmitting career understandings

to students via the one person closest to students--the teacher. The instructional units were designed to infuse career development goals into the existing K-12 school program. Both the instructional units and the career development goals of the school-based model were an attempt to develop a package worthy of national dissemination. Model I, the school-based model, was considered the cornerstone of the Comprehensive Career Education Model, and the successful installation of instructional units was considered crucial to Model I. Thus, it seemed necessary to study different facets of the implementation of career instructional units prior to national dissemination.

One obstacle considered to be of consequence to the success of unit installation and the eventual success of career education, was the attitudes of those teachers involved. Many viable and worthwhile educational endeavors have had their effectiveness greatly reduced because teachers were not receptive to the change. And, change is a supposition that was fused with the original concept of career education.

The tendency of teachers representing different parts of education to separate from one another and divide the entire enterprise was offered by Marland (50) as an example of why we need teacher commitment. The dochotomy between academic and vocational segments of education was offered as an example of the academic snobbery produced by that tendency to separate. Teachers continue to aid in perpetuating an academic society that values general

knowledge above useful knowledge by viewing the programs of vocational education and industrial arts as secondarily important. There was no evidence available that would indicate either positive or negative teacher attitudes toward career education. However, since the career development goals of career education are skewed toward delivering useful knowledge rather than academic knowledge, it was possible that teacher attitudes toward career education might be negative. It was also possible that involvement in career education might change a teacher's perception of those segments of education valuing the utility of knowledge. Subsequently, changes in teacher attitude toward career, vocational, and industrial arts education accompanying involvement in career education was considered of professional importance.

In summary, the relationship of career education instructional units to the school-based model was considered extremely important. In addition, attitudes of teachers toward the concepts studied were believed to be important if the school-based model was to succeed. Thus, it seemed important and even necessary to study the attitudes of teachers who participated in implementing career education instructional units. Therefore, the present study was conducted.

The ACCE '72 (Attitude Change--Career Education, 1972)[4] study went beyond attitudes and studied semantic-differential

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[4]ACCE '72 was used as the title of the data-gathering instrument in this study, and is also used to refer to the entire study--i.e., the ACCE '72 study.

meanings, of which attitude is a part. Change in the meanings of career, vocational and industrial arts education accompanying participation in career education instructional unit implementation was documented. The study offered the possibility of obtaining a better description of teacher perceptions of the three concepts. The results of the study were viewed as important information for future studies in the areas of career education, vocation education, and industrial arts education. The study also offered possibilities of producing data with ramifications relevant to national dissemination of career education instructional units, teacher education, inservice education, and semantic-differential measurement.

RATIONALE OF THE STUDY

Because of the large number of intervening variables that could influence a change in semantic-differential meanings, no consideration was given to the reasons for change. Instead, only that independent variable that accompanied change in semantic-differential meanings was recognized. However, since the study recognized the independent variable of involvement in career education, it seemed necessary to substantiate how involvement could theoretically influence change in meaning and attitude. Therefore, the following rationale was offered to give the study a rational basis.

Any change exhibited toward the concepts used in the study by the participating teachers may have been explained by reference to the "principle of consistency." Using this principle,

participants were viewed as individuals with organized sets of cognitions concerning different concepts of education. Those teachers who participated in implementing career units, as well as the inservice training accompanying the process of implementation, were exposed to new information concerning career education and/or related concepts. As they were introduced to an expanded range of information, teachers could have experienced disharmony in their psychological structure or sets of cognitions. When inconsistency did develop, the individual probably attempted to restore consistency between the new information and the original set of cognitions. According to the "principle of inconsistency," a successful adjustment of the original set of cognitions would have produced equilibrium of the psychological structure.

Several change models agree that there is a tendency for people to behave in ways which will maintain an internally consistent cognitive system. These models or approaches differ primarily in their emphasis upon different sources of inconsistency and the means by which consistency can be measured (Rosenburg, 64:65-66; Kiesler, 40:157). Heider (25) is usually given credit for the original "principle of consistency" which, when studied, implied that a person's beliefs and feelings were either balanced or unbalanced and that balanced states were stable states and resisted change, while unbalanced states were unstable states and changed to produce balance or consistency.

The Principle of Congruity

Each of the several derivative models have ingredients which gave meaning to any change, or lack of change, measured. However, the congruity model (Osgood, 59:199) was considered the most relevant total plan for explaining any change measured in the ACCE '72 study. According to the principle of congruity, when two attitudinal concepts or objects of differing evaluation are linked together by an assertion, there is a tendency for the evaluations of each of the concepts to move to a point of equilibrium or congruity. The pressure to regain congruence tends to cause a change in the evaluation of one or the other or both of the concepts. If, for example, a man is opposed to high school athletic programs but hears a coach, whom he admires, describe the benefits of organized athletics in the high school, there would be a tendency toward a positive change in evaluation of high school athletics, or a negative change in evaluation of the coach, or both.

Tannenbaum (75) offered research prestige to evidence that persuasive assertions were effective in changing evaluations toward concepts. However, there has been no categorically operational definition of an "assertion" developed (Osgood, 59:202). Therefore, the intuitive recognition of a source of assertions toward the concepts of the study was all that was necessary to make the congruity model operational.

Relating the preceding model to the ACCE '72 study, sources could have been considered building coordinators (inservice leaders

and/or most importantly the printed information contained in CCEM instructional units. The concepts (vocational education, career education, and industrial arts) studied were considered ones with which the participating teachers were familiar. And the assertions were messages or information received from the sources that were related to the concepts. If sources were considered evaluative (- or +) signs, and concepts as other signs, and the messages and information as assertions relating the signs, then it was possible to assume that the conditions of the congruity principle were operational.

The expressed intent of the inservice training offered to those teachers of the experimental group was to enhance the smooth implementation of instructional units. And the instructional units hopefully enhanced the concept of career education and related concepts of vocational education and industrial arts. Since any given belief is related to other beliefs, a message or information which leads a person to change his mind about a concept should also change his mind on logically related but not explicitly mentioned concepts (Rosenburg, 64:205). Therefore, any change toward any of the concepts studied was explained by the principle of consistency, with particular reference to the principle of congruity, and the acceptance or rejection of the information associated with the disruption of the cognitive structures of the participants.

DEFINITIONS

Terms and concepts used in developing the study were defined so as to apply operationally to the objectives of the study. When necessary, formal definitions for the terms were also given. These major definitions follow:

ACCE '72

1. Attitude Change--Career Education, 1972.

2. Title of data-gathering instrument . . . also, used to refer to the entire study.

Semantic differential

A combination of association and scaling procedures designed to give an objective measure of the connotative meaning of concepts (Osgood, 56:171). The task of a respondent is one of rating a concept along a scale between two bi-polar word opposites.

Semantic Space

Semantic space is multi-dimensional and is composed of some unknown but finite number of descriptive scales. It has both direction and intensity.

Semantic Dimension

A portion of the total semantic space. Bi-polar scales used to describe the semantic space are component parts of three semantic dimensions or factors. The individual factors are: (1) evaluative, (2) potency, and (3) activity. Each factor was isolated by factor analysis.

Concepts

The stimulus words which appear at the top of each response page of the ACCE '72 data-gathering instrument. The following concepts were used: (1) career education, (2) industrial arts, and (3) vocational education.

Evaluative Factor Score

The sum of seven constituent scalar scores (good-bad, timely-untimely, successful-unsuccessful, fresh-stale, pleasant-unpleasant, important-unimportant, valuable-worthless).

Potency Factor Score

The sum of three constituent scalar scores (wide-narrow, deep-shallow, strong-weak).

Activity Factor Score

The sum of three scalar scores (active-passive, sharp-dull, hot-cold).

Concept Scores

The sum of constituent scalar scores for a given factor and the sum of all factor scores. Every subject thus has three factor concept scores plus a total concept score for each of three concepts (vocational education, career education, and industrial arts).

Meaning

1. The sum of the evaluative, potency, and activity factor scores.

2. A representational mediation process (Osgood, 59:31).

Attitude

1. The evaluative factor score.

2. A psychological construct, or latent variable, inferred from observable response to stimuli, which is assumed to mediate consistency and covariation among these responses. Attitudes may also be inferred from expressive or symbolic behavior in which overt choice is implied or indirectly expressed, as on questionnaires, in interviews, and in responses to projective techniques or by observation of overt behavior related to but not identical to the choices in question (Harris, 24:212).

Change

The variation between pretest-posttest (before and after treatment) scores. The direction of change is specified as either positive, negative, or zero change.

CCEM

Comprehensive Career Education Model.

Career Education Instructional Unit

A CCEM treatment unit consisting of classroom lessons designed to affect changes in identified career themes.

Involvement

Participation in implementation of career education instructional units as well as the inservice training accompanying this implementation.

Inservice Education

Training or educational activities designed to promote the smooth implementation of career education instructional units.

Building Coordinators

Inservice leaders with the responsibility of preparing teachers to implement career education units.

Experimental Subjects

Participating teachers of the Mesa Public Schools who became involved in career education during the period of the study.

Control Subjects

Participating teachers of the Mesa Public Schools who did not become involved in career education during the period of the study.

Industrial Arts

Term used to replace more formal term industrial arts education.

ASSUMPTIONS

The investigator made the following assumptions concerning the research process of the study:

1. The participating teachers were familiar with the concepts of career education, industrial arts, and vocational education.
2. The teachers' responses were honest.
3. The ACCE '72 instruments were marked and scored properly.
4. The intervals marked on the ACCE '72 instrument were equal, continuous, and passed through an origin of zero (center interval).
5. The seven-point scale was adequate and desirable.

6. Attitudinal change and change in semantic-differential meaning precedes behavioral change.

7. The directions accompanying the ACCE '72 form were adequate, and each participant read the directions.

8. The semantic-differential scales (bi-polar words) were adequately representative of the semantic dimension for which they were a measure.

9. The semantic-differential scales were relevant to the concepts rated.

10. The criterion measure (ACCE '72) of semantic-differential meaning would detect any differences between experimental and control group subjects or changes within groups.

DELIMITATIONS

Delimitations of the investigation included:

1. The study was limited by the reliability and validity of the semantic-differential instrument.

2. The study was limited to a representative sample of teachers from the Mesa Public Schools, Mesa, Arizona, for the school year 1972-73. Therefore, any extrapolation of the results to other systems would be conjectural in nature.

3. The study was limited to comparison groups chosen from grades K-6.

4. The study did not attempt to attribute change to a single variable. Changes in semantic-differential meanings

accompanying the independent variable of involvement in career education were studied, but causes of change were disregarded. Since it is possible that unique intervening variables were present, the exploratory nature of the study should be recognized.

CHAPTER SUMMARY

In summary, the constituent parts of Chapter I were presented in order to describe the general nature and purpose of the study. The study to be reported was conducted in cooperation with the Mesa Public Schools and the Center for Career Development, Mesa, Arizona. The assessment was directed at measuring changes in semantic-differential meanings exhibited by teachers who became involved in career education during the 1972-73 school year. The principle of consistency, with particular reference to the principle of congruity, was described and related to the present study as a rationale for change. Other elements which determined the scope and importance of the study were reviewed.

CHAPTER II

RELATED RESEARCH AND LITERATURE

The purpose of Chapter II was to report upon (1) research and literature relative to the semantic-differential technique of measuring meaning, and (2) literature that furnished evidence of the logical associations that existed between the concepts studied in the ACCE '72 study.

THE SEMANTIC DIFFERENTIAL[1]

The measurement of meaning presents special problems in research. The topic deals with intangible responses which are not easily isolated or measured. Society creates traditional beliefs which are difficult to express, possibly because little effort is made to recognize and describe them. Often such traditional ideas are assumed to be true and are seldom investigated. Pioneering work on attitudes was initiated by Thurstone (76) and Likert (43). However, Charles E. Osgood's (59) semantic differential gave researchers a way to measure meaning. With this in mind, the semantic-differential approach was selected as a basis for the construction of the measuring instrument used in the present study.

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[1] A description of the semantic-differential instrument used in the present study can be found in Chapter III.

The so called semantic-differential test was found to be a misnomer. Osgood (55:197) declared the semantic differential to be a technique employed by researchers to get at the meaning of concepts and other stimulus words or ideas and not necessarily a test. Kaufmann (37:437) stated:

> Major assets of the semantic-differential include the fact that it requires no verbalization on the part of the respondents . . . . The semantic-differential is particularly valuable as a measure of reactions to objects and experiences that are essentially nonverbal in nature . . . . The semantic-differential furthermore taps emotional and unconscious responses. It helps to get around people's tendency to give well-reasoned, logical, socially acceptable replies.

The technique is a combination of association and scaling procedures which provide an objective measure of the connotative meaning of concepts (Osgood, 56:171).

The basic structure of a semantic-differential instrument involves the following:

1. A concept to be considered
2. "N" number of bipolar adjectives (adjectives which are opposite in meaning)
3. A scale or distance between the adjectives so that both direction and intensity of feeling may be indicated.

In his discussion of the logic of the semantic differential, Osgood (55:227) has indicated three separate hypotheses which form the base of his methodology. These he states as follows:

> 1. The process of description or judgment can be conceived as the allocation of a concept to an experiential continuum, definable by a pair of polar terms.

2. Many different experiential continua, or ways in which meanings vary, are essentially equivalent and hence, may be represented by a single dimension.

3. A limited number of such continua can be used to define a semantic space within which the meaning of any concept can be specified.

After developing and testing the semantic differential, Osgood and his associates (59:77) have concluded that a concept used on a semantic-differential instrument acts as a "stimulus" and the respondent's act of checking (rating) represents a terminal "response." Although a measure of meaning, it should be understood that the semantic differential measures only a small part of the universe of experience suggested by the word meaning. The semantic-differential technique is considered a solid approach to the measurement of connotative meaning, but the meaning of a concept measured by a semantic-differential instrument should be considered operationally limited when compared to broader implications of the word (Marks, 47:16).

Osgood, et al. (59:76) contend that there are no standard concepts or scales; rather the concepts used in a particular study depend upon the purpose of the research. Researchers should adapt concepts and scales to meet their research needs. Standardization of the semantic differential came not through standard concepts and scales but through the allocation of concepts to a common semantic space defined by a common set of general factors. Osgood and his associates (59) identified these major factors, dimensions, which are present in meaningful judgments, by factor analysis. After eliciting one-word responses to a large number of concepts from

many subjects, bipolar word scales were developed and selected for use on a frequency-of-usage criterion. They analyzed responses to these semantic-differential scales over a wide range of concepts to ascertain their factorial composition and to determine the nature and weight of the factors. After statistical analyses isolated existing traits or factors, they were then named. The process of naming the factors was a subjective procedure--names were chosen to best describe the bipolar words which were saturated or loaded with a common content. The three major factors isolated and named included:

1. Evaluation--represented scales such as good-bad, beautiful-ugly, sweet-sour, clean-dirty, tasty-distasteful, valuable-worthless, kind-cruel, pleasant-unpleasant, sweet-bitter, etc. This factor accounted for 68.55 per cent of the common variance in Osgood's study.

2. Potency--represented scales such as large-small, strong-weak, heavy-light, thick-thin, etc. This factor, commonly referred to as the "football player" factor, accounted for 15.46 per cent of the common variance. It was discovered that potency factors have a tendency to be contaminated with the evaluative factor.

3. Activity--represented scales such as fast-slow, active-passive, hot-cold, sharp-dull, etc. This factor displayed some relation to physical sharpness or abruptness as well. The factor accounted for 12.66 per cent of the common variance.

Some other factors were less prominent and accounted for relatively little of the total variance (Osgood, Suci, and Tannenbaum, 59:35-39). Thus, the three major factors represent independent dimensions of the semantic space within which the meaning of concepts may be specified.

When responding to a semantic-differential instrument, one responds to a concept along scales which are composed of seven positions between two bipolar word opposites such as:

kind _____:_____:_____:_____:_____:_____:_____ cruel
1 2 3 4 5 6 7

A respondent may choose any one of the extreme positions or an intermediate position. An "x" in space number "1" would indicate that the respondent judged the concept being rated as "kind." A response in space number "4" would indicate a neutral response. The respondent thus describes with his response both the direction and intensity of his judgment.

A review of acceptable forms for a semantic differential revealed that a typical printed instrument might be of two varieties. These alternate forms were presented in Figure 1.

After concepts and scales are selected and instruments marked, the researcher then has the basis of data which can be organized with a semantic-differential matrix. Osgood and his colleagues (59) explained that the raw data, a collection of check marks against bipolar scales, can be changed into a manageable form by arbitrarily assigning a digit to each of the seven positions on each scale. They further stated that these digits may be

FORM I

(concept)	(polar adj.)	(scales)						(polar adj.)
GIRLS	rough	____:	____:	____:	____:	____:	____:	X smooth
TEACHERS	fair	____:	X :	____:	____:	____:	____:	____ unfair

FORM II

(concept)
GIRLS

(polar adj.)	(scales)						(polar adj.)
rough	____:	____:	____:	____:	____:	X :	____ smooth
fair	____:	X :	____:	____:	____:	____:	____ unfair
active	____:	____:	____:	____:	____:	X :	____ passive

Note: Words in parentheses do not appear on forms given to respondents. X's represent respondent's independent judgments.

Figure 1

Alternate Forms of the Semantic Differential

1, 2, 3, 4, 5, 6, and 7 or +3, +2, +1, 0, -1, -2, and -3. For most mathematical treatments, the choice makes no difference. In Osgood, Suci, and Tannenbaum's (59:86) explanation, they offered the following preference:

> . . . The set from +3 to -3 has the heuristic advantage of fixing an origin in the center of the semantic space which corresponds to the neutral "4" position on the scales as well as reflecting the bipolar nature of the scales we used. A person's score on any item is the digit corresponding to the scale position he checks.

After determining respondent scores, a matrix consisting of cells formed by the number of scales times the number of concepts times the number of subjects can be formed. Each cell contains a number from one to seven representing a raw score judgment of a particular concept against a particular scale by a particular respondent.

Various procedures were found to compare a sample of respondents or to compare concepts. Many studies have used a measure of difference between profile scores as recommended by Osgood, et al. (59:90-97). For explanatory purposes, suppose that two subjects responded to a concept on ten bipolar scales. The ten scalar scores then yielded three concept factor scores. The list below represents a hypothetical accumulation.

	Respondent X	Respondent Y
Evaluation	6	2
Potency	6	3
Activity	5	2

Osgood, et al. (59), in order to measure the semantic distance (D) between two profiles, use the generalized distance formula:

$$D = \sqrt{(x-y)^2}$$

For example, the D between X and Y in the example above was

$$D = \sqrt{(6-2)^2 + (6-3)^2 + (5-2)^2} = 5.8$$

Thus, the profile distance between respondent X and respondent Y on the concepts studied was 5.8.

Marks (47:20) contended that if one is interested in different components of a profile, the D score is not appropriate since the constituent components are lost. When it is suspected that factor scores behave independently, another statistical measure should be used. Little research was found that attempted to validate the generalized distance formula (D) as a measure of meaning similarity, although many studies were found that made use of the formula.

Scores obtained from semantic-differential instruments can be analyzed with a variety of statistical treatments, other than Osgood's D, which indicate a number of important qualities of the technique. Creelman (12:45-46) suggested that the semantic-differential technique provides the following:

> 1. . . . precise method of measuring changes in meaning.
>
> 2. . . . tool for demonstrating that behavior tends to change in relationship to changes in the phenomenal world of individual meanings.
>
> 3. . . . map of the "semantic space" of a concept whose relationships (with regard to dimensions and change) to other concepts and to various kinds of observable behavior might be determined.
>
> 4. . . . method which has the quality of being itself a device for discovering the meanings of words, and it may be used for measuring the amount of transfer or generalization relative to conditioning, learning, and association methods.

A sample of the statistical treatment employed in the *semantic-differential studies reviewed was outlined in Table 1.* The entries of the table were offered to demonstrate the versatility of the semantic-differential technique as suggested above.

The semantic-differential technique is receiving increased recognition as a measure of change in the self-structure. Webb and Harris (82) used the semantic differential as a means of evaluating a six-weeks NDEA Counselor Training Institute. A secondary purpose was to demonstrate the interpretive value of the semantic differential. Adult counselors made significant attitudinal changes on certain concepts following a six-week NDEA summer institute. Webb and Harris created an instrument to assess changes in meanings of concepts as a result of the institute. They used Osgood's D to measure changes and Wilcoxson's paired replicates test for statistical comparison of the data. The data indicated a difference between the sexes on the semantic differential. These differences were most marked on the potency factor scale. The difference for each concept was calculated from the basal concept--"my actual self." Webb and Harris discovered, as have others, that the evaluative dimension may allow more significant findings to be reported than if raw score data were averaged over all three dimensions. The NDEA group was not tested again. Therefore, the stability of the changes cannot be known. Fewer than forty subjects comprised the sample. In regard to the secondary purpose of the study, Webb and Harris (82:263) concluded that the semantic

TABLE 1

A TABULAR REPRESENTATION OF THE STATISTICAL TREATMENT EMPLOYED IN A SAMPLE OF SEMANTIC-DIFFERENTIAL STUDIES

Author	Field of Investigation	Statistical Treatment
Dearen (13)	Title I--In-service program and attitude change.	Analysis of variance Analysis of Covariance Correlated $\underline{t}$ test
Ford and Meisels (21)	"Social Desirability and the Semantic Differential"	Product moment correlations
Hunt (28)	Measurement of self-concept in relation to vocational choice (using Kuder OII)	D score modified to C score $Cij = \left[\frac{(Dij-\bar{D})}{\sigma_D}(-2)\right] + 10$ Plus analysis of variance
Husek and Wittrock (29)	Attitudes toward teachers	Principal components factor analysis of an 80 x 80 matrix of intercorrelations of means and standard deviations
Miron (53)	Effect of instruction modification on test-retest reliabilities of the semantic differential	Pearson product-moment correlation coefficients Analysis of variance related to speed, recall, and concepts
Osgood (55)	Estimate of factors using fifty descriptive scales	Factor analysis Product-moment correlations
Osgood and Suci (57)	"A Measure of Relation Determined by Both Mean Difference and Profile Information"	D statistic $D = \sqrt{\sum_i dj1^2}$ where, D = distance between variable j and 1

TABLE 1 (continued)

Author	Field of Investigation	Statistical Treatment
		djl = the difference between the score in cell ij and the score in cell il on s.d. matrix
Ross (65)	"Change in the Use of the Semantic-Differential with a Change in Context"	Factor analysis
Stempel (72)	"The Relationship of Cost of Instruction and Attitude Toward Instruction"	Analysis of variance
Webb and Harris (82)	"A Semantic-Differential Study of Counselors in an NDEA Institute"	D statistic Wilcoxson's Paired Replicates Test

differential collects data with excellent interpretive value and appeared to accurately measure semantic changes.

In a study of the effect of class size upon students, Stempel (72) using the semantic-differential technique with a sample of 132 college seniors, attempted to discover their attitudes toward lower cost subjects, subjects typically having large enrollments. The study dealt specifically with the attitudes of students toward instruction in four subjects required for graduation. The independent variable of the study was not class size but the cost of instruction. Stempel assumed a close relationship between the two variables. The courses studied differed considerably in instructional cost. The hypothesis tested was that attitude toward instruction in a particular course is positively related to the cost of instruction in that course. Results showed no indication of a more favorable attitude toward higher cost subjects than toward lower cost subjects. One might question that the concept "instruction in English at Central" (or physical education or political science or speech) might be a stimulus that related to intrinsic elements of the four subjects mentioned and, therefore, have little bearing on the cost of instruction and/or class size issue. The semantic differential was chosen because it gave students a wider range of expression than was typical of other questionnaires. It was concluded that the semantic differential appeared to be a useful technique in measuring attitudes toward instruction.

Ross (65), in an effort to discredit Osgood's hypothesis that a concept provokes a response which is independent of context, designed a semantic differential with context contamination. A set of names of ideologies was prepared. They were embedded in two contexts: (1) a further set of names of ideologies (set 1), and (2) a diverse set of terms designed to vary widely on the activity and potency dimensions (set 2). The counterhypothesis predicted that the ideology names common to both contexts would be rated differently on the two occasions. Sixty students on one side of a room were then given set 1 to rate; sixty students on the opposite side of the room were given set 2 to rate. When the results were analyzed, the counterhypothesis regarding context contamination was not supported, and the results were resoundingly in favor of Osgood's hypothesis that context has a very limited effect on one's responses to various concepts.

The need for rigid instructions for the administration of a semantic differential was investigated by Miron (53). He found that the influence of instruction modification upon the test-retest reliabilities of the semantic differential was negligible. Four groups, designated as fast-memory group, slow-memory group, fast-no-memory group, and slow-no-memory group, took a twenty concept by twenty scale semantic differential twice in a single sitting within a two-hour period. Fast groups were told to work rapidly while slow groups were given no instructions relative to speed. On the second trial, memory groups were asked to try and

duplicate their responses from the first trial while no-memory groups were given no instructions about remembering. One hundred twelve college students participated in this reliability study which confirmed the wisdom of Osgood's instructions to students to work rapidly. The fast groups had scores with fewer mean deviations between administrations and displayed better recall of previous answers. In view of the findings, it would appear to be more desirable to instruct subjects to proceed at a rapid rate. However, little or no difference was found in other modifications of typical instructions which suggests that instruction modification is of negligible influence. The effect of greater time lapse between administrations was not tested.

Hunt (28) reported research on self-concepts and their relationship to choice of vocation. The theoretical issue was whether or not complex decisions were related to self-concepts. The hypotheses were (1) that self-concept and other semantic concepts are differentially related to vocational choice, and (2) that vocational interest can be predicted from interrelationships between self-concept and other concepts (Hunt, 28:242). Concept similarity was measured with a semantic-differential instrument and the Kuder Occupational Interest Inventory (OII) was used as a criterion measure of vocational interest. Groups composed of 258 professional men judged sixteen concepts related to self, other people, and vocational choice on 25 polar scales. Data analysis for hypothesis 1 produced three significant functions between criterion groups. In a cross-validation group of male undergraduates, by using semantic-

differential profiles, 70 out of 139 subjects were correctly classified according to the Kuder OII. Of these same subjects, 83 of 125 were correctly classified according to first choice of vocation. Both hypotheses were supported. The results suggested that an individual tends to express his self-concept through his complex, real life decisions, such as vocational choice.

That the semantic-differential technique is of limited use in schools because of social desirability variables, was questioned by Ford and Meisels (21). The correspondence between social desirability variables and the evaluative factor of the semantic differential was investigated by defining the social desirability value of a given bipolar scale as the discrepancy between the mean social desirability ratings of its separate adjectives. The index of evaluativeness was the evaluative factor loading of the scales. The fifty bipolar scales of Osgood, et al. (59) were used. Two sets of judges produced the social desirability values assigned to each scale. Person or person-like concepts, such as LADY, FATHER, ME, MOTHER, and RUSSIAN were chosen as concepts to be judged through the use of a semantic differential. Accordingly, the social desirability rating instructions specified the concept "people" as the object of description, and the judges were asked to rate the desirability or undesirability of adjectives as "human characteristics." Results indicated that the valuation factor loadings were predictable from the social desirability scale values. Thus, the same representational mediational process which was

hypothesized to underlie semantic-differential judgments was found to be basic to the responses made to questionnaires and other personality assessment devices so common in education.

COMPARISON OF CONCEPTS

There seemed to be a logical association among the concepts studied (career education, vocational education, and industrial arts), since each was concerned with a body of knowledge related to the world of work. It was the purpose of this section to compare and contrast the objectives of the concepts studied by reviewing authoritative statements of the goals of each.

Industrial Arts Education

Educational practices of industrial arts education have, in the past, lagged behind educational theory. But, in the early 1950's, industrial arts educators began narrowing the gap between theory and practice. The impetus for this sudden movement was a realization that curricular practices of industrial arts were closer to industry and technology than any other general curriculum. Public schools were in need of a leader in the academic community which could provide a technological orientation to general curricula (Carrel, 2:63).

Industrial arts educators were beginning to recognize that the role of industrial arts should be to relate industry and technology to the general curriculum for the benefit of all youth. The period of reorganization of industrial arts education

resulted in several approaches for interpretating industry as well as the clarification of purposes. Related to this period of flux, Carrel (2:64) stated:

> A determined search for clarification and unity of purposes resulted in broad basic concepts of purposes now widely accepted in the field. Interpreted and translated into educational experiences, within the concept of industrial arts as a study of industry and its associated technology, the accepted basic concepts of purpose provide the foundation for the role of industrial arts in American education.

Although the resultant objectives of industrial arts have been published in many forms, the basic concepts can be summarized as global purposes. The broadly stated goals of industrial arts as related by Steeb (71:261) and Carrel (2:65) are:

1. To develop insights and understandings of industry and technology and their place in our society.

2. To identify and develop talents, aptitudes, and interests toward technical pursuits and the applied sciences.

3. To develop an understanding of industrial processes, provide knowledge of technical and industrial information, and cultivate an understanding of practical applications of scientific principles.

4. To develop basic skills in the proper use of common industrial tools, machines, and processes.

5. To develop creative abilities to solve practical problems involving materials, processes, and products of industry.

Since it is important in this technological age that education provide some understanding of technological advances and some first-hand experiences with the tools of industry, it seems that

the modern goals of industrial arts will continue to enhance general education in the future (Harris, 24:688).

In summary, the goals of modern industrial arts programs were the result of an attempt to interpret industry for all American youth. Industrial arts should be considered a part of general education and its purposes as supportive of the goals of public education.

Career Education

Career education was aptly described by Kabakjian (34:263) as "an unifying force to bring together what was formerly college preparatory, collegiate, general, and vocational education as equal partners in the educational enterprise." Career education was not intended as a replacement of any curricular segment of education, but as a central theme to which each segment could relate. Although career education is not yet totally developed, it is not without a conceptual framework. This framework is made up of career development themes from which the goals of career education were developed. From a United States Office of Education publication, Steeb (71:261) reiterated the following career education objectives:

> 1. To make all education subject matter more meaningful and relevant to the individual through restructuring and focusing it around a career development theme.
>
> 2. To provide all persons the guidance, counseling, and instruction needed to develop their self-awareness and self-direction; to expand their occupational awareness and aspirations; and to develop appropriate attitudes about the personal and social significance of work.

3. To increase the educational and occupational options available to all persons through a flexible educational system which facilitates entrance and re-entry either into the world of work or the educational system.

4. To assure the opportunity for all persons to gain an entry-level marketable skill prior to their leaving school.

5. To prepare all persons completing secondary school with the knowledge and skills necessary to pursue further education or to become employed.

6. To provide services for placing every person in the next step in his development whether it be employment or further education.

7. To build into the educational system greater utilization and coordination of all community resources.

The career education concept recognizes the importance of careers in determining our life style. It is designed for everyone and should be viewed as a life-long process. Essentially, career education is "education" with a new emphasis and broadened horizons.

Vocational Education

Vocational education is education for work--specialized education as distinguished from general education. Vocational education has been defined as education designed to develop skills, abilities, understandings, attitudes, work habits, and appreciations needed for productive employment or to improve or progress within a vocation (Harris, 24:1555). Concerning this definition, Harris (24:1555) indicated:

> For certain types of employment the amount of specialized education is relatively small and largely manipulative in nature . . . ; for other types of employment extensive preparation is needed involving insights and understandings frequently combined with manipulative skills . . . .

As implied in the definitive statement of vocational education, education for work is of two kinds: (1) that which is provided prior to employment for the purpose of preparing a person to enter employment, and (2) that which is provided after employment for the purpose of developing a higher degree of competence.

In summary, the purpose of vocational education is specialized and related to preparation for employment. The following list represents the goals of vocational education:

1. To develop manipulative skills necessary for employment or progression within a vocation.

2. To provide related technical information necessary to develop the abilities and understandings required for employment or progression within a vocation.

3. To develop personal-social traits necessary for employment or progression within a vocation.

Summary of Concept Goals

From a review of the goals of career education, vocational education, and industrial arts, one can readily see that the objectives of each are not mutually exclusive. In fact, the relationships become readily discernible when the objectives are compared. Table 2 represents an attempt to categorize the goals (presented in the preceding descriptions) of each concept into generalized goal categories for the purpose of showing similarities. The generalized goal categories were selected after aligning related goals across concepts.

TABLE 2

JUXTAPOSITION OF THE GOALS OF VOCATIONAL EDUCATION,
CAREER EDUCATION AND INDUSTRIAL ARTS

Generalized Goal Categories	Concepts		
	Career Education	Industrial Arts	Vocational Education
ORIENTATION TO THE WORLD OF WORK	relates the subject matter of all subjects to a central theme of career development	develops insights and understandings of industry and technology and their place in our society	relates necessary understandings of an occupation and the interdependency of that occupation and other occupations
SKILL DEVELOPMENT	assures an opportunity for all persons to gain an entry-level marketable skill prior to leaving school	develops basic skills in the proper use of common industrial tools, machines, and processes	develops manipulative skills necessary for employment in a particular occupation or cluster of occupations
TECHNICAL KNOWLEDGE	prepares all persons completing secondary school with the knowledge and skills necessary for employment or further education	develops an understanding of industrial processes and the practical application of scientific principles	relates technical information associated with a vocation or cluster of vocations

TABLE 2 (continued)

Generalized Goal Categories	Concepts		
	Career Education	Industrial Arts	Vocational Education
OCCUPATIONAL-EDUCATIONAL GUIDANCE	develops self-awareness and self-direction; expands occupational awareness and aspirations; and develops an appreciation of the personal and social significance of work	identifies and develops talents, aptitudes, and interests toward technical pursuits and the applied sciences	develops personal-social traits necessary for employment

When a comparison is made, one should not forget to analyze distinguishing features unique to those concepts being compared. In the case of a comparison of the goals of career education, vocational education, and industrial arts, the distinguishing features are intent and organization. For example, the intent of industrial arts is to educate all people to live more effectively in a world which is influenced by industry and technology. On the other hand, the intent of vocational education is to prepare a student for employment. Vocational education deals not only with industry (vocational-industrial education) but with other segments of the world of work, such as agriculture, business, and the home. Career education incorporates all of education including industrial arts and vocational education. Industrial arts education is usually organized as a course of study within public schools, colleges, and universities, while vocational education includes programs in secondary schools, apprenticeship programs, industrial programs, etc. Career education is not a course of study but a generic term referring to a new emphasis for all of education.

In conclusion, career education, vocational education, and industrial arts possess commonalities among goal statements, but each is independently important with a unique focus.

CHAPTER III

PROCEDURES

Chapter III was composed of seven major sections. The study's design was discussed and documented in the first section. The second and closely associated section described the decisions made concerning possible comparison errors in the investigation. Next, the population and the sample were identified. The remaining sections offered information related to the data-gathering instrument, data-collection procedures, reduction strategies, and statistical analyses used.

THE ACCE '72 DESIGN

Randomized Pretest-Posttest Control Group Design

The Randomized Pretest-Posttest Control Group Design described by Campbell and Stanley (10:13-24) was considered most appropriate for this quasi-experimental investigation. Campbell and Stanley (10:13) suggested one of three designs "currently recommended in methodological literature." Of the three recommended, the Randomized Pretest-Posttest Control Group Design (design 4) was chosen because of its control of internal validity factors, the possibility it offered to go beyond randomization to verify the equivalency of original groups, and its suitability to measuring change.

During the developmental stages of the study the number of teachers who would become involved in planned CCEM activities was not known, nor if randomized selection would be possible. Therefore, the design protected the authenticity of the results through pretest scores, since pretest scores can be used to verify the equivalency of matched groups and/or limited samples. Also, pretest scores were a necessary measure to describe change in the semantic-differential dimensions studied.

The following paradigm represents a pictorial description of the Randomized Pretest-Posttest Control Group Design:

$$R \quad O_{1e} \quad X \quad O_{2e}$$

$$R \quad O_{1c} \qquad O_{2c}$$

Where R represented random assignment of participants to comparison groups, X represented the treatment, O_1 represented the pretest, O_2 the posttest, e represented the experimental group, and c represented the control group.

Sources of invalidity controlled by the Randomized Pretest-Posttest Control Group Design appear in Table 3. The sources of invalidity primarily controlled by the design consisted of all sources of internal invalidity listed by Campbell and Stanley (10:8).

The random assignment of teachers to control or experimental groups provided further control over internal invalidity by controlling intrasession history. The Randomized Pretest-Posttest Control Group Design calls for simultaneity of experimental and control testing sessions; this was observed in the ACCE '72 study by collecting pretest

Table 3

FACTORS JEOPARDIZING THE VALIDITY OF THE RANDOMIZED PRETEST-POSTTEST CONTROL GROUP DESIGN

Sources of Invalidity	Control
Internal	
History	+
Maturation	+
Testing	+
Instrumentation	+
Regression	+
Selection	+
Mortality	+
Interaction of Selection & Maturation, etc.	+
External	
Interaction of Testing and X	-
Interaction of Selection and X	?
Reactive Arrangements	?

and posttest data for the two groups simultaneously. Since simultaneous collection dates were observed, different persons administered the ACCE '72 form. However, explicit directions were given each person responsible for administering pretests and posttests in order to maintain as much control over the similarity of collection sessions as possible. Data were collected from twenty-two different elementary schools. It happened that through randomized selection, both experimental and control group participants were located in all twenty-two schools; therefore the ACCE '72 data-gathering instrument was administered to mixed groups in all cases, thereby further reducing any possible interaction between sources of invalidity and comparison groups.

Sources of external invalidity not specifically controlled by the design included: (1) interaction of pretest and treatment; (2) interaction of selection and treatment; and (3) reactive arrangements. In reference to the first source of invalidity, Kerlinger (39:310) stated that a pretest can sensitize experimental subjects so that they respond to the experimental treatment differently, particularly when the connection between test or data-gathering instrument and the treatment is readily discernible. On the other hand, Kerlinger (39:311) asserted that pretesting should have no great sensitizing effect if testing is an accepted and normal part of the routine. While the sensitizing weakness of studies employing pretests was considered important, this weakness was resolved in the ACCE '72 study by the following considerations:

1. Neither the participating teachers (experimental and control subjects) nor the principals (administrators of the ACCE '72 instrument) were told of the connection between the independent variable of the study and the ACCE '72 form. Since involved and uninvolved teachers responded to the ACCE '72 form in mixed groups, no clues were given that would relate the treatment to the pretest instrument.

2. The semantic-differential type instrument was considered to have very little sensitizing effect upon experimental subjects. Since the scales used were composed of standard bipolar words, the effect of sensitization upon any particular concept would seem to be cancelled. Since there are the same number of negative cues as positive cues in a semantic-differential instrument, there was no reason to believe that the pretest caused experimental subjects to be any more aware of positive assertions than they were of negative assertions.

3. The teachers of the Mesa Public Schools were given frequent attitudinal tests. In the past few years Mesa teachers have participated in a number of exploratory programs which have in turn stimulated the collection of data in the form of teacher responses. Therefore, testing could be considered a normal activity for Mesa teachers.

The second source of external invalidity, interaction of selection and treatment, was controlled to the extent that participating teachers were representative of elementary teachers in

the Mesa Public Schools, Mesa, Arizona. But consumers of this report who wish to externalize the results to other school systems should compare the characteristics of the selected elementary school system with those of Mesa. An attempt was made to insure representative selection by using the randomization technique to assign teachers to comparison groups. Stratified proportional randomization was used to select a sample. Teachers were stratified according to grade level and randomly selected from each stratum.

The third source of external invalidity, reaction effects of experimental procedures, was adequately controlled. Van Dalen (78:265) stated: "If Ss [subjects] know they are participating in an experiment, they might not react normally to X [treatment]." With regard to undermining reactive arrangements, which will enable generalizations concerning the results of the study to be made with more confidence, Van Dalen (78:266) stated:

> To minimize the reactive effect of experimental procedures, an effort should be made to keep Ss and those who administer the treatments or tests unaware of the fact that an experiment is being conducted . . . The less conspicuous the experimental procedures are, the better.

Prior to the conception of the ACCE '72 study, Mesa teachers knew they were to implement career education instructional units as a part of the instructional program during the 1972-73 school year. Since the participants knew nothing of the connection between an experiment and implementation involvement, reaction to the treatment because of knowledge of the study would seem to have been negated as a source of external invalidity.

ERROR DECISIONS

Any observed differences in comparison group means was considered due in part to errors of various kinds. Lindquist (44:9-11) identified three types of errors: (1) Type S, (2) Type G, and (3) Type R. The following paragraphs describe how the effects of these possible errors were minimized in the ACCE '72 study.

Type S errors are defined as that part of an observed treatment due solely to the assignment of subjects to comparison groups. To minimize type S errors, participants randomly selected from the population were randomly assigned to comparison groups. Lindquist (44:9) further stated that random assignment to groups will not necessarily eliminate Type S errors. The experimental (control) group could have by chance contained a larger proportion of individuals who demonstrated highly positive (negative) semantic-differential meanings toward the concepts studied. Therefore, Question #1 and resulting Hypotheses 1.1 and 1.2 were included to verify the equivalency of the original groups.

Errors resulting from extraneous factors, which tend to have the same effect on all members of any one comparison group but a different constant effect on the members of any other comparison group, are referred to as Type G errors. Type G errors were severely minimized by randomly assigning chosen participants to either experimental or control groups. Lindquist (44:9-10) stated that extraneous factors arising during the investigation

that cannot be randomized will in most cases be accidental and without bias; therefore, they will tend to cancel out with larger numbers of replications. The sample used in the present study was a random sample from a parent population and replications were nonexistent, but subgroups representing individual elementary schools could have been sources of Type G errors. However, since each subgroup was composed of both experimental and control subjects, it seemed unlikely that any extraneous factor would have had a pronounced effect on differences between group means. Since there were a large number of subgroups (twenty-two), the effects of any extraneous factor across subgroups would be without bias between comparison groups and tend to cancel out within the total sample.

Type R errors can be considered those characteristic of individual replications or subpopulations. Lindquist (44:10-11) described Type R errors in educational settings in the following manner:

> The observed effect of a treatment in any particular school could then be free from error so far as that school alone is concerned, yet be considerably in error as an estimate of the average treatment effect for all schools in the given population of schools.

Type R errors did not apply to the ACCE '72 study, since they apply only to replications. The present study drew a representative sample from a parent population in which twenty-two schools out of twenty-two were represented.

POPULATION AND SAMPLE

Four hundred fifty-three elementary level teachers employed at the beginning of the 1972-73 school year by the Mesa Public

School System, Mesa, Arizona, comprised the population of this study. This parent population did not include librarians, media center specialists, support personnel, or special education teachers. A master list of names was compiled which included the names of all elementary (K-6) teachers recognized as a part of the population.

Next, the appropriate sample size was estimated. It was found that arbitrary numbers or percentages concerning sample sizes were misleading. Accordingly, Snedecor and Cochran (69:111) demonstrated the need for the following information if appropriate samples were to be selected:

1. The size of difference between the true effect of the treatments that the investigator regards as important (d),
2. An estimate of the population variance (σ_d^2),
3. The desired probability (P) of obtaining a significant result if the true difference is d,
4. The significance level of the test (α, β).

They also offered the following formula for a two-tailed test for independent samples:

$$n = (Z_\alpha + Z_\beta)^2 2\sigma_d^2 / d^2$$

Where n equaled the size of each sample (control and experimental), the total number of observations was 2n. Z represented the normal deviate corresponding to the significance level.

An estimate of the population variance was calculated by using the results obtained from a small sample of the population

used to check the reliability of the ACCE '72 instrument. However, due to inexperience at estimating d, it was decided that the following derivative formula should be used:

$$d = (Z_{\alpha} + Z_{\beta})\ \sigma_{d}\ \sqrt{\frac{2}{n}}$$

Alpha was set at 0.05 with a corresponding Z_{α} of 1.96 and Z_{β} of 1.64. The desired probability (P) was chosen as .95 and multiple calculations were made for different sizes of n. The following graph was prepared to represent those calculations.

It seemed obvious after viewing the plotted curve of Figure 2, that a point of diminishing returns was reached when n was increased above a maximum of 100. Therefore, it was decided to sample 200 subjects (100 control, 100 experimental) from the parent population. Since the variance used was only an estimate, the process used had an inherent weakness. On the other hand, the process was viewed as being more reliable than selecting an arbitrary number from one of the many available lists.

The 453 names included on the master list were then divided into strata according to grade level. In Table 4, data were presented which summarized the proportional stratified sampling strategy of the study. An independent sample was drawn from each of the seven strata. The number of teachers selected from each stratum was proportionate to the size of that stratum in the total population. After appropriate strata samples were selected, they were then randomly divided into experimental and control groups.

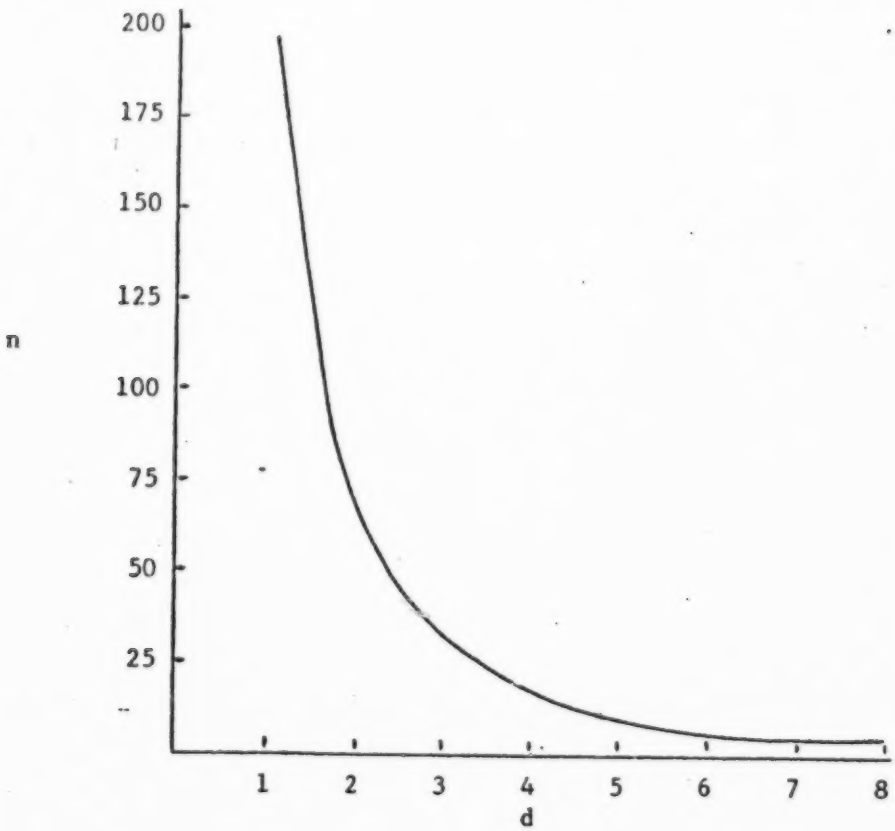

Figure 2

Differences (d) Needed for Varying Sample Sizes

TABLE 4

SUMMARY OF PROPORTIONAL STRATIFIED SAMPLING STRATEGY

Grade Level Strata	Stratum Population	Percentage of Total Population	Percentage x 200	Stratum Sample
Kdgn.	39	.0861	17.22	17
1	84	.1854	37.08	37
2	69	.1523	30.46	31
3	73	.1611	32.22	32
4	66	.1457	29.14	29
5	70	.1545	30.90	31
6	52	.1148	22.96	23
Totals	453	.9999	199.98	200

A summary of the final composition of comparison groups was presented in Table 5. The data as presented in Table 5 show that members of two comparison groups were chosen from each of seven strata. The comparison groups were composed of 100 experimental and 100 control subjects.

Stratification is commonly employed in sampling plans so that heterogeneous populations with high variances are divided into segments which are homogeneous with means as different as possible and variances as small as possible. In such cases, a gain in precision over simple random sampling can be expected. However, the stratification principle was used in the ACCE '72 study for a different reason--to secure a balanced distribution among grade levels. Since CCEM instructional units were grade level specific, a representative sample from each of the seven grades was necessary. Since a simple random selection did not insure satisfactory distribution, a stratified random sample was drawn from the population. Even though the characteristic for which representativeness was sought could not be connected with the independent variable of the study, the stratification strategy used could have done nothing but increase the precision of the sample over a simple random selection.

TABLE 5

SUMMARY OF COMPARISON GROUP COMPOSITION

Grade Level Strata	Stratum Sample	Experimental Group	Control Group
Kdgn.	17	9	8
1	37	18	19
2	31	16	15
3	32	16	16
4	29	14	15
5	31	16	15
6	23	11	12
Total	200	100	100

CRITERION INSTRUMENT[1]

The form of the semantic differential used for this study was constructed by the investigator. Essentially, the instrument was considered to be a combination of association and scaling procedures which measured the meanings, primarily attitudes, of concepts on thirteen bipolar adjective scales (seven-point scales). Each semantic scale, defined by one set of bipolar adjectives, was assumed to represent a portion of the semantic space in which the rated concepts existed. When combined, a respondent's ratings represented his evaluative, potency, and activity directional reactions (i.e., good vs. bad) to the concepts, as well as the intensity of these reactions.

The thirteen sets of bipolar words were arranged on a single page and used to collect responses to one of three concepts. Thus, there were three response pages--one for each of the concepts studied.

Reliability

Reliability was considered to be synonymous with the stability or repeatability of scores acquired on the semantic-differential data-collection instrument. In reference to the reliability of the semantic differential, Shaw and Wright (66:30) reported that it compared favorably to other attitude scales.

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[1] A copy of the criterion instrument can be found in Appendix A.

During the factor-analytic studies conducted by Osgood, Suci, and Tannenbaum (59:126-127), test-retest correlation data were collected. One hundred subjects responded to forty scales over twenty concepts. Tests and retests were correlated across all items and the reported coefficient was .85. Other correlation coefficients calculated under different conditions with different concepts and scales as well as other estimates of reliability were also reported, and all suggested a high stability. Osgood, et al. (59:130) further indicated the average errors of measurement of the semantic-differential scales to be about three-quarters of a scale unit--the evaluative scales were reported as being most reliable, on the average of about half a scale unit.

Luria (45:217) reported reliability estimates measured by mean absolute deviations and found the evaluative scales to be more reliable than either the potency or activity scales. Luria also reported that average shifts seemed to indicate that extremity of scores has a positive effect on reliability. Miron (53) reported test-retest correlations for 112 subjects over twenty concepts with twenty scales each. He reported Pearson product-moment coefficients for factor scores with different experimental groups. Twelve coefficients ranging from .968 to .996 were reported for the evaluative, potency, and activity factors. Jenkins, et al. (32:693) reported a study of 360 words, rated on twenty scales by eighteen groups of thirty subjects. The reliability of scale values was found to be .97. Mean scale values correlated +.97

with median scale values. Norman (54:583) reported factor scores to be more reliable than single scale scores.

In addition to the evidence of reliability reported from the preceding studies, a test-retest check of the reliability of the ACCE '72 form was also conducted. The consistency of the scores of thirty subjects from the parent population were examined under test conditions in two sessions separated by a one-week interval. Correlation coefficients were calculated for factors across concepts. These coefficients were reported in Table 6.

TABLE 6

TEST-RETEST CORRELATION COEFFICIENTS (r) OF ACCE '72 FORM: FACTORS ACROSS CONCEPTS

Factor	Coefficient (r)
Evaluative	.903
Potency	.836
Activity	.807

An inspection of the entries of Table 6 indicated that the factor scores across concepts were quite reliable. The evaluative factor seemed to be more reliable than the potency or activity factors.

Since measurements taken to test the hypotheses were concerned with factors within concepts, calculations were performed on concept factor scores. Table 7 summarized these calculations.

TABLE 7

TEST-RETEST CORRELATION COEFFICIENTS (r) OF ACCE '72
FORM: CONCEPT FACTOR SCORES

Concepts	Coefficients (r)		
	Evaluative	Potency	Activity
Career Education	.877	.811	.851
Industrial Arts	.907	.738	.717
Vocational Education	.903	.781	.697

The coefficients reported in Table 7 revealed the evaluative concept scores to be most reliable. Table 7 presented data which afforded a comparison between concept factor scores and factor scores across concepts. The data suggested that factor scores across concepts were more reliable than concept factor scores. Further calculations also showed that total concept scores were more reliable than concept factor scores.

In summary, the greater reliability of evaluative scores may have been due to the greater number of scales related to that dimension. It was not surprising to find that total concept scores and factor scores across concepts were slightly more reliable than concept factor scores. Subtest scores are often found to be less reliable than total combined scores, which suggests that high order meaning change will be consistently more stable than changed performances which are partial expressions of meaning.

Reliability of the ACCE '72 form was not unlike the reported reliability of other semantic-differential instruments, which suggested a reliable measuring instrument with higher reliability on evaluative scores.

Validity

Validity of an instrument is defined as the extent to which it actually measures what it is supposed to measure. The semantic differential was proposed as a method of measuring meaning. Ideally, then, correlation coefficients should have been calculated from scores obtained with the semantic differential and other scores obtained with some independent criterion of meaning. But there is no commonly recognized quantitative criterion of meaning (Osgood, 59:140). Therefore, the decision was made to use "face validity" as defined by Fox (22:368), along with examples of external validity in lieu of "congruent validity."

Lazowick (42:182) offered evidence to support "face validity" of the semantic differential. He studied the correlation of behavior patterns between subjects and their parents and concluded that,

> . . . It appears that the semantic differential may be used to investigate the nature of identification as theorized here, and that it yields results that are both convincing and meaningful. It also encourages us to consider further investigations making use of the technique.

Osgood, et al. (59:141) offered several examples of studies which provided considerable evidence for "face validity" of the semantic differential. For example, in a study on the effect of mixing or combining words, a set of eight adjectives were rated

by 200 subjects and mean factor scores were calculated. The adjectives included in the study were: ARTISTIC, HAIRY, LISTLESS, AVERAGE, SINCERE, SHY, TREACHEROUS, and BREEZY. The results indicated that SINCERE and ARTISTIC received the most favorable ratings on the evaluative factor and LISTLESS and TREACHEROUS received the most unfavorable; on the potency factor, TREACHEROUS and HAIRY were the most potent and LISTLESS and SHY the weakest; on the activity factor, BREEZY and TREACHEROUS were most active and LISTLESS and SHY most passive. Concerning these results, Osgood and his associates (59:141) concluded,

> These are "reasonable" characterizations of these adjectives, and the reader will note many other such examples. Throughout our work with the semantic differential we have found no reasons to question the validity of the instrument on the basis of its correspondence with the results to be expected from common sense.

Mehling (51) used the implications of other investigators to check the "face validity" of the assumption that the semantic-differential technique measures both the direction and intensity of attitude. The results Mehling (51:578) obtained from responses to a semantic differential led to the conclusion that "the semantic differential as used in this study does measure both direction and intensity of attitude." The study also added statistical evidence to the assumption that the middle (number 4) interval on a seven-point semantic-differential scale represents the neutral point in attitude. Kelly and Levy (38) reported a study which further supported the discrimination potential of the semantic-differential technique. And Messick (52) supplied data which

supported the assumptions of scaling properties implied by the semantic differential.

Unlike those mentioned above, Solarz (70) compared a criterion "external" to the differential scaling device with the activity factor of the semantic differential. The study measured the activity perceived in printed words. Printed words were used to stimulate pencil tapping motion, and then the tapping scores were correlated with activity factor scores obtained from the same printed words. The study provided a correlation coefficient of $r = .90$ between mean semantic scale values and mean tapping scores (Solarz, 70:92). The high correlation found in this study was considered as an external validity correlate for the activity factor of the semantic differential. In addition, Marks (47:57-63) reported two clinical studies which attempted to correlate performance on the semantic differential to performance in a life situation. The assessment by psychiatrists in interviews of patients' attitudes toward three emotional concepts was the criterion variable. Marks (47:60) concluded that "the semantic differential measured the attitude of patients to these three emotional concepts as accurately as did psychiatrists in a single psychiatric interview." Correlations reported in the study were highly significant for factor, scalar, and directional scores.

Osgood, et al. (59:142-143) provided another check on the validity of semantic measurement by using actual voting behavior as an external criterion. In a 1952 election study, a semantic-

differential instrument and a questionnaire were administered to a sample of voters. On the questionnaire, the subjects indicated how they planned to vote--for Eisenhower, for Stevenson, or "don't know." From the responses to the semantic differential, a profile of a typical Eisenhower voter and Stevenson voter was compiled. The vote of each subject that responded "don't know" was predicted from the correspondence of his concept-meanings to the typical Stevenson voter vs. the typical Eisenhower voter. Of the 18 subjects that responded "don't know," 14 voted as predicted, which was significant at the 5 per cent level. When the potency factor was added to the evaluative factor, prediction results increased to 17 out of 18 and a significance level of 1 per cent. The addition of the activity factor failed to increase the prediction percentage (Osgood, 59:142-143).

The preceding paragraphs were considered sufficient support of the validity of semantic measurement to permit the use of a semantic differential in the ACCE '72 study.

Choice of Concepts

Osgood, Suci, and Tannenbaum (59:77-78) pointed out that the class and form of concepts should depend chiefly upon the interest of the investigator and the nature of the problem. However, it was suggested that concepts from which considerable individual difference can be expected and those that are familiar to the subjects of the study be used. Unfamiliar concepts were considered a source of regression toward the middle of the scales.

The investigator was interested in the concepts of (1) career education, (2) vocational education, and (3) industrial arts; how (2) and (3) would help in molding the form of (1), and vice-versa. First, it was conceived that the division of these three concepts into constituent objects of thought would provide a more stable core of concepts from which conclusions could be drawn. However, attempts to subdivide the three concepts resulted either in concepts from which no variability (all positive) of ratings could be expected or concepts which all teachers could not be expected to understand. A review of the professional literature of teachers suggested that the three original concepts should be known to teachers, and the investigator judged them to be concepts from which considerable individual differences could be expected.

After the concepts were chosen, characterizations were devised for each of the concepts. The following list included those characteristics and the sources from which they were taken:

1. CAREER EDUCATION. The Comprehensive Career Education Model Glossary for Staff Development (31:6).

> Career education is a comprehensive and organized instructional program designed to facilitate the career development of students. It is an attempt to integrate the general, academic, and vocational curricula and to bridge the gap between the school and the community. The program is characterized by "learning how to live" and "learning how to make a living."

2. INDUSTRIAL ARTS EDUCATION. Definitions of Terms in Vocational Technical and Practical Arts Education (3:11).

> Instructional shopwork of a non-vocational type which provides general educational experiences centered around the industrial and technical aspects of life today and offers

orientation in the areas of appreciation, production, consumption, and recreation through actual experiences with materials and goods. It also serves as exploratory experiences which are helpful in choice of a vocation.

3. VOCATIONAL EDUCATION. Definitions of Terms in Vocational Technical and Practical Arts Education (3:22).

> Vocational or technical training or retraining which is given in schools or classes (including field or laboratory work incidental thereto) under public supervision and control or under contract with a state board or local educational agency, and is conducted as part of a program designed to fit individuals for gainful employment as semi-skilled or skilled workers or technicians in recognized occupations . . . (but excluding any program to fit individuals for employment in occupations which are considered professional or as requiring a baccalaureate or higher degree).

Prior to administering the ACCE '72 instrument, the concepts described above were randomly assigned to response pages in order to avoid any position effects.

Choice of Scales

Choice of scales followed the choice of concepts, and the process was somewhat more structured than that of choosing concepts. Osgood and his associates (59:33-75) have provided the results of factorial work (factor analysis) on fifty scales which they reduced to three independent factors--evaluative, potency, and activity. It was found that to make ideal use of a semantic differential one should choose a scale that is perfectly aligned with or loaded on its factor and perfectly reliable. If the ideal had been possible, the present study would have required only three sets of bipolar words to describe the semantic space--one for each of the three semantic dimensions or factors. In practice it was found that

bipolar scales are neither perfectly aligned with a specific factor nor perfectly reliable; therefore, it was necessary to use a sample of closely related scales to represent each factor. The score derived from summing the individual scores on scales chosen to represent a particular factor was considered both more representative and more reliable than any single scale score.

Osgood, et al. (59:78-79) offered the following criteria for choosing scales:

1. Factorial composition--select at least three scales to represent each factor. These should be maximally loaded on that factor and minimally on others.

2. Relevance--select scales which are most relevant to the concepts to be judged.

3. Semantic stability--if the same scales are to be used for different concepts, select scales that are stable across all concepts. For example, a scale such as large-small will be used denotatively in judging concepts such as BOULDER or ANT, but it is likely to be used connotatively in judging SIN or NIXON.

Scales for the ACCE '72 study were selected with the preceding criteria in mind. While trying to satisfy each individual standard, it was discovered that concessions were necessary. The scales which were finally selected appeared to be a compromise between the extremes literality and figurativeness as they applied to the concepts. After review of the fifty scales studied by Osgood and associates (59:33-75) and the scales reported upon by Jenkins, et al. (32:688-699), thirteen scales were chosen. The scales that

were selected, together with their respective loadings on the three major factors of meaning, were presented in Table 8.

TABLE 8

FACTOR LOADINGS OF THE SCALES USED IN THE ACCE '72 STUDY

Scales	Factors		
	Evaluative	Potency	Activity
EVALUATIVE			
Good-Bad	.88	.05	.09
Valuable-Worthless	.79	.04	.13
Pleasant-Unpleasant	.82	-.05	.28
Fresh-Stale	.68	.01	.22
*Timely-Untimely	.37	.04	.04
*Important-Unimportant	.38	.04	.31
*Successful-Unsuccessful	.51	.08	.29
POTENCY			
Strong-Weak	.19	.62	.20
Deep-Shallow	.27	.46	.14
Wide-Narrow	.26	.41	-.07
ACTIVITY			
Sharp-Dull	.23	.07	.52
Active-Passive	.14	.04	.59
Hot-Cold	-.04	-.06	.46

*Taken from Jenkins (32:691). Most entries were taken from Osgood (59:37).

The scales listed in Table 8 were randomly rotated both vertically and horizontally from concept to concept on the ACCE '72 data-gathering form. The seven evaluative, three potency, and three activity scales were mixed into one vertical column, numbered, and randomly rotated to avoid position and transfer effects upon the respondents.

Administration

ACCE '72 forms were disseminated to the field principals who administered the forms to the appropriate teachers in controlled testing sessions. The respondents judged and marked thirteen scales over three concepts for a total of thirty-nine responses. The response periods were untimed, but most respondents finished in less than ten minutes.

After administering the ACCE '72 form to a beginning college secondary education class, the directions used by Price (61) were altered with excerpts from Osgood, Suci, and Tannenbaum (59:83).

The following specimen page entitled "Directions" was included as a part of every ACCE '72 response pamphlet.

Three additional specimens are exhibited below--two from the criterion instrument and one of a transparent template used to mark and score the instruments. The first of the three specimen pages was offered as a model of a response page as respondents read it. The next specimen represented a typical response page after scoring.

(Specimen page)

DIRECTIONS

This is not a test but an instrument designed to measure the meanings of certain concepts to various people. There are no right or wrong answers; however, it is important that your responses accurately reflect your own feelings.

At the top of each page in this booklet is a concept in bold type. Below each concept is a series of thirteen descriptive-adjective scales, such as the one which appears below:

PARENTS

severe :___:___:___:___:___:___:___:___: lenient

Note: The concept and scale above and description below are used for explanatory purposes only.

Keeping the concept clearly in mind as you work, here is how you use the scales. An (x) toward the left of the scale indicates that you judge the concept to be more "severe" than "lenient." Successive units toward the left indicate the degree of severity. Similarly, an (x) to the right of the scale reflects a judgment of "lenient" with successive units to the right of the scale indicating greater degrees of leniency.

You are to rate each scale in order. Do not skip around, and do not leave any scales blank. Sometimes you may feel as through you have responded to the same item previously. This will not be the case, so do not look back and forth through the items. Do not spend too much time deliberating on any one item, but try to give your first impression and work rapidly. You should place your (x) in the middle of the spaces (:_X_:___:), and not on the boundaries (:___X___:).

We are interested in your own honest feelings. Keep in mind that you should respond to each concept as you perceive it at this time, and not as you think it could or should be. When you have completed all of the scales on a page, and only then, go on to the next page.

(Specimen page--as subjects read it)

VOCATIONAL EDUCATION

narrow	:___:___:___:___:___:___:___:	wide
untimely	:___:___:___:___:___:___:___:	timely
cold	:___:___:___:___:___:___:___:	hot
strong	:___:___:___:___:___:___:___:	weak
important	:___:___:___:___:___:___:___:	unimportant
worthless	:___:___:___:___:___:___:___:	valuable
deep	:___:___:___:___:___:___:___:	shallow
fresh	:___:___:___:___:___:___:___:	stale
sharp	:___:___:___:___:___:___:___:	dull
bad	:___:___:___:___:___:___:___:	good
passive	:___:___:___:___:___:___:___:	active
unpleasant	:___:___:___:___:___:___:___:	pleasant
unsuccessful	:___:___:___:___:___:___:___:	successful

(Specimen page--after marking and scoring)

CAREER EDUCATION

			E	P	A
unpleasant	: : : : : X : : :	pleasant	5		
passive	: : : X : : : :	active			3
bad	: : : : : : X :	good	6		
weak	: : : X : : : :	strong		4	
narrow	: X : : : : : :	wide		2	
hot	: X : : : : : :	cold			7
unimportant	: : : : : : : X :	important	7		
worthless	: : : : : : X :	valuable	6		
untimely	: : : X : : : :	timely	3		
fresh	: : X : : : : :	stale	6		
sharp	: : : X : : : :	dull			5
deep	: : : : : : X :	shallow		2	
unsuccessful	: : : : X : : :	successful	4		
Total of Column of Scalar Scores = Factor Scores =			37	8	15

Total of Factor Scores = Concept Score = 60

Method of Scoring

The third specimen represented a typical transparent template used to place over response pages for the purpose of marking scale ratings in appropriate columns. Factor scores were obtained by tabulating columnar scores.

The center spaces (4) on each of the scales were considered the origin. Favorable or unfavorable responses were indicated by the selection of a polar term, and judgment intensities were indicated by the distance from the origin. Therefore, a respondent could have chosen to respond either positively or negatively with three levels of intensity in either direction. Each scale was scored from 1 to 7 with the low end (1) located closest to the unfavorable polar word.

Thirteen scalar scores were appropriately distributed among 3 factor scores for all 3 concepts. The factor scores were obtained from scalar scores by simple addition. The evaluative factor consisted of 7 scalar scores (see definitions for constituent scales); therefore, the range of scores was 7 (least favorable) to 49 (most favorable), with 28 representing the origin score (exact neutrality) for this particular dimension. The potency and activity factor scores were composed of 3 scalar scores each. The possible ranges of scores for the potency and activity dimensions were 3 to 21, with midpoints of 12. Total concept scores were obtained by adding the evaluative, potency, and activity factor scores. The range of scores which represented the total concept scores could have been as low as 13 and as high as 91, with midpoints of 52.

(Specimen page--scoring template)

INDUSTRIAL ARTS

		E P A
good	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
passive	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	
dull	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	
wide	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
timely	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
deep	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
successful	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
stale	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	
cold	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	
weak	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	
pleasant	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
important	: 7 : 6 : 5 : 4 : 3 : 2 : 1 :	
worthless	: 1 : 2 : 3 : 4 : 5 : 6 : 7 :	

HOLES IN TEMPLATE

DATA COLLECTION

All subjects who composed the stratified sample completed the ACCE '72 form prior to the time when career education instructional units were scheduled to be implemented. After testing, the instruments were collected by field principals and returned to the investigator by school mail.

The participants of the study who became involved in implementation of career education instructional units were posttested at the close of the 1972-73 school year. The control group was posttested at the same time. Again, the ACCE '72 pamphlets were collected and returned by field principals who had previously been given detailed instruction in administration and collection procedures.

The collection of pretest and posttest data required the cooperation of field principals as well as respondents. The cooperation of the personnel involved was characterized by extremely high return percentages (pre=99.5%, post=97.5%) and completion percentages (pre=97.5%, post=97.5%).

DATA REDUCTION

Data-reduction processes included the manipulation of three transparent templates used to score the semantic-differential pamphlet's three concepts. Since the scales were arranged randomly (both vertically and horizontally) from concept to concept, an individual template or score sheet was needed for each concept.

In addition to marking and scoring the information collected, data were transferred to data-accumulation sheets which enhanced the

ease with which raw data could be transferred to computer punch cards. Data were recorded on punch cards and analyzed with a Univac 1110 computer. After manipulating the data required in the present study, it is recommended that data of factor-analytic studies and studies of augmented sample size be collected in a form that enables scoring to be done by machine. With 200 respondents, the time required to reduce the data obtained was excessive. Therefore, researchers making use of the semantic-differential technique in larger studies should be advised of the time and/or expense of data-reduction processes.

DATA ANALYSIS

Data which were collected on the ACCE '72 semantic-differential instrument were analyzed to ascertain: (1) differences in evaluative, potency, activity, and total concept pretest ratings of comparison groups, (2) changes in factor scores and total concept scores of involved and uninvolved teachers, and (3) differences between comparison groups after treatment.

For the purpose of testing the equivalency of the original groups, pretest mean scores and variances of comparison groups were used. Both F test for analysis of variance and Hartley's Test for Homogeneity of Variance were used to determine any systematic differences in groups. Changes in factor scores and total concept scores of both involved and noninvolved participants were determined by analyzing the mean changes from pretest to posttests. Significance was tested by correlated t tests for

dependent samples. Criterion responses of comparison groups were analyzed to determine if differences existed after the treatment by using F test for analysis of variance.

All tests for significance were reported at the 0.05 level unless the 0.01 level was reached.

CHAPTER SUMMARY

Chapter III described the procedures and methods used in the ACCE '72 study. The techniques presented were designed to enable the investigator to detect any change in the semantic-differential meanings of selected concepts accompanying involvement in career education. Two groups of participants from the Mesa Public Schools, Mesa, Arizona, were selected from a population of 453 elementary teachers. The groups were selected by a stratified random sampling technique.

The comparison groups responded to a semantic-differential instrument composed of three concepts and thirteen sets of bipolar adjective scales. The criterion instrument was designed to measure the evaluative, potency, and activity dimensions of meaning. Analyses of group responses were made by using F test of analysis of variance and correlated t test for dependent samples.

CHAPTER IV

RESULTS

In this chapter, the results of the present study were summarized with the hypotheses that were tested. The statistical test(s) utilized in testing each hypothesis were also given. The results were presented in the same sequence in which hypotheses were previously stated. Interpretations of the results were reported in the final chapter of this dissertation.

CRITERION RESULTS

The findings associated with hypotheses 1.1 and 1.2 were the results of an attempt to verify the equivalency of the original comparison groups. In order to provide a statistical baseline for succeeding hypotheses, comparison group pretest scores were compared.

Hypothesis 1.1

There are no differences between the mean evaluative, potency, and activity concept scores of experimental and control subjects (pretest).

Statistical tests for Hypothesis 1.1. F tests (analysis of variance) were used to determine the significance of mean evaluative, potency, and activity concept scores among experimental

and control subjects. The F test model of independent observations for a single classification was used.

Results (Hypothesis 1.1). A review of the data listed in Table 9 indicated that none of the F ratios approached the magnitude needed for significance (critical value of F was 3.88 at the .05 level of significance).

TABLE 9

F RATIOS OF MEAN EVALUATIVE, POTENCY, AND ACTIVITY CONCEPT SCORE DIFFERENCES OF EXPERIMENTAL AND CONTROL SUBJECTS (PRETEST)

Concepts	Dimensions of Meaning		
	Evaluative	Potency	Activity
Vocational Education	0.925	0.262	0.640
Career Education	0.340	0.259	0.000
Industrial Arts	0.874	1.036	0.283

Note: None of the F ratios above were significant at the .05 level.

Since homogeneity of variances is assumed when using analysis of variance as a test of significance, Hartley's Test for Homogeneity of Variances as described by Winer (83:206) was used to check for differences between variances of comparison group scores. Twelve different sets of variances were compared--one for each of three dimensions of meaning for each concept plus a total concept comparison for each of the three concepts. None of the sets of variances

differed significantly; therefore, it was assumed that analysis of variance was a suitable test of significance for use in the present study.

Hypothesis 1.2

There are no differences between the mean total concept scores of experimental and control subjects (pretest).

Statistical tests for Hypothesis 1.2. By using tests for differences between means derived from independent total concept scores, questions were resolved. F tests (analysis of variance) were used.

Results (Hypothesis 1.2). The data cited in Table 10 revealed that none of the F ratios exceeded the critical values of F necessary to be associated with the region of rejection at the .05 level of significance.

TABLE 10

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF EXPERIMENTAL AND CONTROL SUBJECTS (PRETEST)

Concepts	Group Means		Statistical Value
	Experimental	Control	F
Vocational Education	65.29	66.80	0.723
Career Education	65.84	66.65	0.207
Industrial Arts	65.86	64.31	0.788

Note: None of the F ratios above were significant at the .05 level.

The findings associated with hypotheses 2.1, 2.2, 2.3, and 2.4 were the results of separate pretest-posttest comparisons of those teachers who became involved in teaching career education instructional units (experimental subjects) and those teachers who did not become involved (control subjects).[1]

Hypothesis 2.1

There are no differences between the before and after treatment mean evaluative, potency, and activity concept scores of experimental subjects.

Statistical tests for Hypothesis 2.1. Correlated-type *t* tests were applied to pretest-posttest mean evaluative, potency, and activity concept scores of experimental subjects. The *t* statistic was used which allowed each subject to serve as his own control during the before and after treatment analysis phase of the ACCE '72 study.

Results (Hypothesis 2.1). A study of the ratios in Table 11 suggested that two *t*'s were associated with the region of rejection. Significant differences were found on both the potency and activity dimensions of the concept INDUSTRIAL ARTS. The critical value of *t* for a two-tailed test at the .05 level of significance was 1.98 (.01 level--2.63).[2]

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[1]For an exhaustive display of pretest-posttest mean score differences of subjects by comparison groups, see Table 22 (Appendix B).

[2]Negative *t* values indicate a change in a negative direction--i.e., mean pretest score was higher than mean posttest score.

TABLE 11

VALUES OF t FOR PRETEST-POSTTEST MEAN EVALUATIVE, POTENCY, AND ACTIVITY CONCEPT SCORE DIFFERENCES OF EXPERIMENTAL SUBJECTS

Concepts	Dimensions of Meaning		
	Evaluative	Potency	Activity
Vocational Education	0.496	1.415	1.526
Career Education	-0.077	0.469	-0.141
Industrial Arts	1.654	**2.773	*2.204

*Significant at the .05 level (**.01)

Hypothesis 2.2

There are no differences between the before and after treatment mean total concept scores of experimental subjects.

Statistical test for Hypothesis 2.2. The significance of pretest-posttest mean total concept score differences of experimental subjects was determined by the use of t tests for correlated means.

Results (Hypothesis 2.2). One significant pretest-posttest total concept score difference was calculated and reported as a t value in Table 12. Again, the mean total concept score for INDUSTRIAL ARTS was found significant at the .05 level. The region of rejection started with a t value of 1.98 at the reported level of significance.

TABLE 12

PRETEST-POSTTEST MEAN TOTAL CONCEPT SCORE DIFFERENCES OF EXPERIMENTAL SUBJECTS

Concepts	Trial Means		Statistical Value
	Pretest	Posttest	t
Vocational Education	65.43	66.90	1.064
Career Education	65.78	65.85	0.077
Industrial Arts	66.02	68.59	*2.425

*Significant at .05 level

Hypothesis 2.3

There are no differences between the pretest and posttest mean evaluative, potency, and activity concept scores of control subjects.

Statistical tests for Hypothesis 2.3. In order to test the significance of pretest-posttest mean evaluative, potency, and activity concept score differences of control subjects, t tests for related samples were used. The t statistic in this case was equivalent to a subjects-by-trials for one sample group and two trials.

Results (Hypothesis 2.3). An inspection of Table 13's entries revealed that none of the t values were significant (critical value of t was 1.98 at the .05 level of significance for a two-tailed test).

TABLE 13

VALUES OF t FOR PRETEST-POSTTEST MEAN EVALUATIVE, POTENCY, AND ACTIVITY CONCEPT SCORE DIFFERENCES OF CONTROL SUBJECTS

Concepts	Dimensions of Meaning		
	Evaluative	Potency	Activity
Vocational Education	-1.794	-1.126	-1.628
Career Education	-0.930	-0.786	-0.145
Industrial Arts	0.992	0.993	0.965

Note: None of the t values above were significant at the .05 level.

Hypothesis 2.4

There are no differences between the pretest and posttest mean total concept scores of control subjects.

Statistical test for Hypothesis 2.4. Correlated-type t tests were utilized to ascertain significant differences among pretest-posttest mean total concept score differences of control subjects. The t values were correlated in that each subject was used as his own control.

Results (Hypothesis 2.4). According to the findings in Table 14, the pretest-posttest mean total concept score differences yielded t values which were not significant at the .05 level for control subjects.

TABLE 14

PRETEST-POSTTEST MEAN TOTAL CONCEPT SCORE DIFFERENCES OF CONTROL SUBJECTS

Concepts	Trial Means		Statistical Value
	Pretest	Posttest	t
Vocational Education	66.96	64.24	-1.851
Career Education	66.31	65.37	-0.855
Industrial Arts	64.41	65.81	1.140

Note: None of the t values above were significant at the .05 level.

The findings associated with hypothesis 3.1 and 3.2 were the results of an attempt to determine differences in semantic-differential meanings between those teachers who had been involved in career education and those teachers who had not been involved. Questions were answered and hypotheses satisfied by comparing the posttest scores of comparison groups.[3]

Hypothesis 3.1

There are no differences between the mean evaluative, potency, and activity concept scores of experimental and control subjects (posttest).

Statistical test for Hypothesis 3.1. F tests (analysis of variance) were used to determine the significance of posttest mean

[3]For complete display of both pretest score comparisons and posttest score comparisons, see Table 23 (Appendix B).

evaluative, potency, and activity concept score differences between experimental and control groups.

Results (Hypothesis 3.1). One F ratio was associated with the region of rejection. Experimental subjects were found to be significantly different from control subjects on the potency factor of the concept INDUSTRIAL ARTS. The F ratios were listed in Table 15.

TABLE 15

F RATIOS OF MEAN EVALUATIVE, POTENCY, AND ACTIVITY CONCEPT SCORE DIFFERENCES OF INVOLVED AND NONINVOLVED SUBJECTS (POSTTEST)

Concepts	Dimensions of Meaning		
	Evaluative	Potency	Activity
Vocational Education	1.167	2.555	3.578
Career Education	0.028	0.293	0.138
Industrial Arts	3.013	*4.491	1.884

*Significant at .05 level

Hypothesis 3.2

There are no differences between the mean total concept scores of experimental and control subjects (posttest).

Statistical tests for Hypothesis 3.2. F tests (analysis of variance) were implemented in order to resolve decisions concerning differences between means derived from independent total concept scores.

Results (Hypothesis 3.2). A review of the F values enumerated in Table 16 revealed that none of the F ratios had an associated probability of .05 or less.

TABLE 16

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF INVOLVED AND NONINVOLVED SUBJECTS (POSTTEST)

Concepts	Group Means		Statistical Value
	Experimental	Control	F
Vocational Education	67.03	64.24	2.591
Career Education	65.87	65.60	0.048
Industrial Arts	68.70	65.43	3.668

Note: None of the F ratios above were significant at the .05 level.

The findings associated with the adjunct objective and hypothesis 4.1 were the result of analyzing pretest total concept scores of all participating teachers. Teachers' scores were repeatedly separated into classification within selected demographic data categories and analyzed in an attempt to add to knowledge of the manner in which a particular teacher might view the concepts studied.

Hypothesis 4.1

There are no differences between the mean total concept score of subjects divided among classifications within selected demographic data categories.

Statistical tests for Hypothesis 4.1. F tests (analysis of variance) were used to determine the significance of mean total concept score differences among classification groups within selected demographic data categories.

Results (Hypothesis 4.1). Of the six demographic data categories analyzed (sex, age, teaching experience, work experience, highest degree held, and grade taught), significant mean total concept score differences were found between classifications within only two of the categories--(1) sex and (2) grade taught. F values were reported on each of the six demographic data categories studied; however, only those that showed significant differences at the .05 level or less, sex and grade taught, were included here.[4]

TABLE 17

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF MALE AND FEMALE SUBJECTS

Concepts	Pretest Means		Statistical Value
	Male (N=46)	Female (N=154)	F
Vocational Education	67.62	65.59	0.968
Career Education	70.16	65.08	*5.428
Industrial Arts	69.09	63.95	**7.016

*Significant at the .05 level (**.01)

[4]See Tables 24-29 in Appendix B for F ratios associated with mean differences within selected demographic data categories.

The critical F value for the .05 level of significance between male and female total concept score differences reported in Table 17 was 3.88; and for the .01 level, the critical value was 6.76. The F value identified in Table 17 for the concept CAREER EDUCATION was well within the region of rejection at the .05 level, and the F value for the concept INDUSTRIAL ARTS afforded an associated probability of less than .01 (.0086).

Table 18 listed the F ratios calculated for teacher groups categorized according to grade taught. A review of the entries within Table 18 revealed that the F value for mean total concept score differences on the concept INDUSTRIAL ARTS was significant at the .05 level of significance.

The critical F value for Table 18 was 2.15 at the .05 level. The F ratio listed for INDUSTRIAL ARTS had an associated probability of .0160.

ADDENDUM RESULTS

During the course of analyzing data for the purpose of satisfying stated hypotheses, other questions were stimulated which were of interest and/or importance. The inclusion of this section was an attempt to relate these addendum findings.

After viewing the results of change in semantic-differential meanings accompanying involvement in career education, it became of interest to determine whether the combined effects of this involvement, intervening variables, and/or district personnel maturation had caused a significant change. Did the semantic-differential meanings

TABLE 18

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF RESPONDENT GROUPS BY GRADES TAUGHT

		Grade Taught							
		Means							Statistical Value
		Kgn.	1	2	3	4	5	6	F
Concepts	N	(17)	(37)	(31)	(32)	(29)	(31)	(23)	
Vocational Education		65.59	64.68	66.35	65.00	70.00	63.90	67.47	0.852
Career Education		63.69	65.76	63.45	67.16	71.75	63.03	68.83	1.721
Industrial Arts		64.94	61.30	64.47	63.97	69.07	63.21	71.13	*2.683

*Significant at the .05 level

assigned to the concepts by elementary teachers of the Mesa Public School System during the 1972-73 school year change? To resolve this question, all 200 participating teachers' scores were analyzed and the findings reported as representative of overall change. Pretest-posttest comparisons of all participating teachers were analyzed with correlated t tests since each teacher acted as his own control. Table 19 offered three significant t values related to overall change.

TABLE 19

VALUES OF t FOR PRETEST-POSTTEST MEAN SCORE DIFFERENCES OF PARTICIPATING TEACHERS

Concepts	Dimensions of Meaning			Total Concept Score
	Evaluative	Potency	Activity	
Vocational Education	-1.051	-0.095	-0.319	-0.768
Career Education	0.733	-0.217	0.000	-0.557
Industrial Arts	1.856	*2.585	*2.205	*2.489

*Significant at the .05 level

For Table 19, the critical t at the .05 level of significance for a two-tailed test was 1.97 and 2.60 at the .01 level. The significant probabilities associated with the t values for the concept INDUSTRIAL ARTS were: potency--.0102, activity--.0269, and total concept score--.0131.

The analysis of mean total concept scores of teachers classified into selected demographic data categories (Hypothesis 4.1) also raised an important question. Since the category "grade taught" showed a significant difference among mean total concept scores on the concept INDUSTRIAL ARTS and since there were more than two groups involved, it was of interest to decide between which groups, or combination of groups, the difference was significant. The only criterion for division of teachers relevant to the category of "grade taught," other than the specific grade, was the separation of teachers into primary (grades K-3) and intermediate (grades 4-6) groups. Therefore, the following question was raised. Do the mean total concept scores of primary and intermediate teachers differ on the concept of INDUSTRIAL ARTS? The data cited in Table 20 revealed that mean total concept score differences between groups of primary and intermediate teachers were significant at the .05 level. To further discriminate between the score differences of these groups on the concept INDUSTRIAL ARTS, additional analyses were made on the primary dimensions of semantic-differential meaning.

TABLE 20

F RATIOS OF INDUSTRIAL ARTS CONCEPT SCORE DIFFERENCES OF PRIMARY AND INTERMEDIATE TEACHERS

Concept	Dimensions of Meaning			Total Concept Score
	Evaluative	Potency	Activity	
Industrial Arts	*6.156	*5.430	3.630	*6.522

*Significant at .05 level

The F values of Table 20 indicated significant mean score differences on the evaluative and potency factors of the concept, as well as significant mean score differences on the total concept score.

Table 17 supplied data relative to the mean total concept score differences of male and female subjects. To enumerate upon the heterogeneity of mean score differences toward the concepts CAREER EDUCATION and INDUSTRIAL ARTS, Table 21 supplied F ratios for the mean concept factor scores.

TABLE 21

F RATIOS OF MEAN CONCEPT FACTOR SCORE DIFFERENCES OF MALE VS. FEMALE ON THE CONCEPTS CAREER EDUCATION AND INDUSTRIAL ARTS

Concepts	Dimensions of Meaning		
	Evaluative	Potency	Activity
Career Education	*5.188	2.782	*6.216
Industrial Arts	**7.013	*4.595	*4.786

*Significant at .05 level (**.01)

The data of Table 21 pinpointed significant differences between male and female on constituent dimensions of meaning and revealed that the evaluative and activity factors both showed significant differences between groups on the concept CAREER EDUCATION. In addition, significant differences were identified on the evaluative, potency, and activity factors for the concept INDUSTRIAL ARTS.

CHAPTER SUMMARY

Data collected with the criterion instrument were analyzed and the results presented in this chapter.

Inspection of the pretest data revealed no significant differences when descriptive comparisons between experimental and control groups were made. The single classification design analysis of mean evaluative, potency, activity, and total concept score differences seemed sufficient to statistically equate the groups prior to treatment.

The statistical tests based on related samples, which were applied to the study's pretest-posttest data, allowed identification of three significant mean differences for experimental subjects and none for control subjects. All three differences represented change on the concept INDUSTRIAL ARTS. Both positive (higher posttest scores) and negative (higher pretest scores) differences were noted for both experimental and control groups. However, those teachers who became involved in career education (experimental group) showed more positive differences, and those teachers who did not become involved (control group) showed more negative differences.

Posttest-only comparisons between means obtained from experimental and control subjects revealed a significant difference on the potency factor of INDUSTRIAL ARTS. Although only one comparison between groups showed significance, in eleven out of twelve

analyses, higher mean scores (more positive) were obtained for the experimental group.

Significant mean score differences were found between classifications within the demographic data categories of "sex" and "grade taught." Pretest mean total concept score analyses of male and female subjects revealed two significant differences. The differences calculated favored male subjects on the concepts CAREER EDUCATION and INDUSTRIAL ARTS. A further analysis of concept factor scores revealed five significant differences. The evaluative and activity factor scores for the concept INDUSTRIAL ARTS were significantly different. A comparison between mean total concept scores of groups divided among "grade taught" categories revealed a significant difference on the concept INDUSTRIAL ARTS. Additional data manipulation also revealed significant differences between scores of teachers on the primary and intermediate grade levels for the concept INDUSTRIAL ARTS.

A synoptical analysis based on related samples of all participating teachers as one group revealed significant overall change on the concept INDUSTRIAL ARTS. Significant differences were revealed on the potency, activity, and total concept scores between trials.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Chapter V summarized the purposes, procedures, and results of the ACCE '72 study. In addition, conclusions and recommendations were made in the form of generalized statements about the results.

SUMMARY

It was the purpose of this study:

1. To assess the changes in semantic-differential meanings of the concepts of career education, vocational education, and industrial arts, exhibited by both a subgroup of teachers who were involved in career education during the 1972-73 school year and a subgroup of teachers who were not involved.

2. To determine if the meanings assigned to the concepts of career education, vocational education, and industrial arts by a subgroup of teachers who were involved in career education during the 1972-73 school year differed from the meanings assigned to the same concepts by a subgroup of teachers who were not involved in career education.

3. To determine if meanings assigned to the concepts of career education, vocational education, and industrial arts differed

among subgroups of teachers classified within selected demographic data categories.[1]

More specifically, the questions raised were:

1. What differences in semantic-differential meanings of selected concepts exist between the original experimental and control groups?

2. What changes in semantic-differential meanings of selected concepts accompany involvement in career education?

3. What differences in semantic-differential meanings exist between teachers who have been involved in career education and teachers who have not been involved?

4. What differences in semantic-differential meanings exist between participating teachers who have been divided among classifications within selected demographic data categories?

Four hundred fifty-three elementary teachers employed at the beginning of the 1972-73 school year by the Mesa Public School System, Mesa, Arizona, comprised the population of the study. A stratified random sampling technique was used to sample 200 participants for the study. The 453 teachers comprising the population were divided into seven strata according to grade level. An independent sample was drawn from each of the seven strata. The number of teachers selected from each stratum was proportionate to the size of that stratum in the total population. After appropriate strata samples were selected,

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[1] Purpose 3 was considered as an adjunct objective of the study resulting in research question 4.

they were then randomly divided into experimental and control groups. Each comparison group was composed of 100 subjects.

The design of the ACCE '72 study required an assessment of semantic-differential meaning changes concomitant with participation in the implementation of career education instructional units; therefore, a pretest-posttest design was required. The criterion instrument developed for use was a form of the semantic-differential technique.[2] Essentially, the instrument was considered to be a combination of association and scaling procedures which measured the connotative meanings of three concepts on thirteen bipolar adjective scales.

The following concepts were presented in the order in which they occurred in the semantic-differential instrument: (1) vocational education, (2) career education, and (3) industrial arts. The test booklet was designed in such a way that each concept appeared at the top of a single page followed by the thirteen bipolar scales.

Scales were chosen using (1) factorial composition, (2) relevance, and (3) semantic stability as criteria for selection. The thirteen scales selected were randomly rotated both vertically and horizontally from concept to concept to avoid position and transfer effects upon the respondents. Each scale was scored from "one" to "seven" where the high end represented the favorable pole. From the thirteen scalar scores, three factor scores were obtained

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[2]For an exhaustive presentation of the criterion instrument, see Chapter III.

by simple addition. The total concept score was also obtained and analyzed as a complete measurement of meaning. A respondent's factor ratings represented his evaluative, potency, and activity directional reactions (i.e., good vs. bad) to the concepts, as well as the intensity of these reactions. The intensity of a particular rating was indicated by its distance from the center scale position.

All participating teachers completed the ACCE '72 form before Comprehensive Career Education Model instructional units were implemented. Those teachers that became involved in teaching the instructional units were posttested at the close of the 1972-73 school year along with those teachers who did not become involved. The data-gathering instrument was administered and collected by field principals in both test modes.

Data were analyzed by F tests (analysis of variance) to ascertain differences between comparison groups. The statistical tests based on related samples, which were applied to the study's pretest-posttest data, were correlated t tests. All tests for significance were reported at the .05 level unless the .01 level was reached.

The original comparison groups were not assumed equal even though a random sampling technique was used to obtain the groups. F tests of analysis of variance were used to determine the significance of mean evaluative, potency, activity, and total concept scores among experimental and control subjects. No significant differences were revealed by descriptive comparisons of mean pretest scores.

Changes within each comparison group were studied and three significant mean differences identified within the experimental group. All three differences represented change on the concept INDUSTRIAL ARTS. The potency, activity, and total concept scores were significantly different between trials for those teachers who became involved in career education. No significant mean score differences were identified between trials within the control group.

Posttest-only comparisons between experimental and control group means revealed a significant difference on the potency factor of INDUSTRIAL ARTS.

Significant mean score differences were also found between classifications within the demographic data categories of "sex" and "grade taught." Within the category of "sex," analyses of mean total concept score differences of males and females revealed a significant difference on both CAREER EDUCATION and INDUSTRIAL ARTS. In addition to the total concept score difference, the evaluative and activity factors of CAREER EDUCATION showed significant differences. Also, the evaluative, potency, and activity dimensions of meaning differed on the concept INDUSTRIAL ARTS. A comparison between mean total concept scores of groups divided among "grade taught" categories revealed a significant difference on the concept INDUSTRIAL ARTS. Additional data manipulation also revealed a significant difference on the same concept between primary and intermediate teachers.

A synoptical analysis based on related samples of all participating teachers as one group revealed significant overall change on the concept INDUSTRIAL ARTS. Significant differences were revealed on the potency, activity, and total concept scores between trials.

CONCLUSIONS

The conclusions for this study were based on the findings resulting from statistical analysis of data gathered from 200 elementary teachers. To extrapolate the conclusions of the ACCE '72 study to populations other than elementary teachers of the Mesa Public Schools would be conjectural in nature without additional research. Conclusions were subsumed under the four major research questions from which the null hypotheses were drawn.

Question 1: What differences in semantic-differential meanings of selected concepts existed between the original experimental and control groups?

Teachers who participated in implementing career education instructional units did not differ from control subjects in their ratings of career education, industrial arts, and vocational education prior to teaching instructional units.

Question 2: What changes in semantic-differential meanings of selected concepts accompanied involvement in career education?

Positive changes in the potency, activity, and total concept scores of industrial arts as measured by the ACCE '72 data-gathering instrument accompanied involvement in career education. It was

concluded that involvement in the implementation of Comprehensive Career Education Model instructional units may be considered as a factor in changing the semantic-differential meaning assigned to the concept of industrial arts. It was also concluded that change toward the concept industrial arts may be expected to be in a positive direction (i.e., more favorable).

The results of statistical analyses of change suggested that the evaluative dimensions of the concepts studied tended to be more stable (i.e., enduring) than the activity or potency dimensions.

Teacher changes in measured semantic-differential meaning toward career education, industrial arts, and vocational education suggested that even greater changes might be achieved through training experiences designed to relate the world of work and classroom activities.

Question 3: What differences in semantic-differential meanings exist between teachers who have been involved in career education and teachers who have not been involved

Experimental teachers of the ACCE '72 study judged the concept industrial arts as being more potent than did control subjects. Even though statistical analyses of differences between experimental and control subjects revealed only one significant difference, the potency of industrial arts, there was evidence that the difference was more extensive. It was found that those teachers who became involved in career education judged all concepts more favorably than those teachers who did not become involved. It was concluded

that those teachers who participated in implementing career education instructional units tended to view career education, industrial arts, and vocational education more positively.

Question 4: What differences in semantic-differential meanings exist between participating teachers who have been divided among classifications within selected demographic data categories?

Analyses of differences between groups classified within the demographic data categories of age, teaching experience, work experience (other than teaching) and degree held revealed no significant differences. Therefore, it seemed as though these classifications were not factors that affected the distribution of associations mediating the concepts career education, industrial arts, and vocational education.

The results of the inquiry revealed that male subjects viewed career education and industrial arts more positively than female subjects. It was concluded that the functional and behavioral peculiarities associated with the variable of sex tended to affect the organized system of meaning associated with concepts related to the world of work.

Analysis of differences among groups classified according to grade taught revealed a significant difference on the mean total concept score of industrial arts. Further data manipulation also revealed a significant difference between primary and intermediate teacher ratings of industrial arts. Intermediate teacher ratings were significantly more favorable on evaluative, potency, and total

concept scores than primary teachers. These findings suggested that teachers' experiences or knowledge related to the concept industrial arts vary according to grade or grade level taught. The results also indicated that more positive attitudes are displayed by teachers on higher grade levels.

Additional conclusions closely related to the major research questions resulted from the present study. These conclusions were presented below.

The ACCE '72 study and related research supported the position that the semantic-differential technique is a useful tool for the measurement of meaning and attitude toward selected concepts.

A review of authoritative literature suggested that the goals of career education, industrial arts, and vocational education can be aligned under generalized goal categories, but that each concept has an unique focus.

A synoptical analysis of teachers who participated in the ACCE '72 study revealed an overall change on the potency, activity, and total concept score of industrial arts.

RECOMMENDATIONS

With reference to the ACCE '72 study, the following recommendations are made:

1. Research should be conducted to more clearly establish the relationship between teacher attitude or meaning change and overt classroom behavior.

2. Public school administrators should consider Comprehensive Career Education Model instructional units as one source of appropriate experiences designed to deliver career development themes.

3. Educational enterprises should conduct cooperative research designed to develop more appropriate training experiences for teachers relative to relating the world of work and classroom activities.

4. More basic research should be conducted to determine methods of infusing career development themes into the subject matter of all curricula.

5. Research should be conducted to establish a basis for determining what forms "assertions" may take to satisfy the "principle of congruity."

6. Further research should be conducted to determine the effect of interaction of variables upon associations mediating a concept.

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APPENDICES

APPENDIX A

CRITERION INSTRUMENT

ACCE '72

RESPONDENT'S NAME

RESPONDENT'S SCHOOL

TEACHER DATA SHEET

Please complete this sheet by circling the appropriate response.

1. Sex: MALE FEMALE

2. Age: Under 30 30-39 40-49 50-59 60 or Over

3. Years of teaching experience (do not include present year):

   0 1 2 3 4 5-9 10-14 15-19 20 or more

4. Years of work experience (other than teaching and/or military experience):

   0 1 2 3 4 5-9 10-14 15-19 20 or More

5. Highest Degree Held: UNDERGRADUATE GRADUATE

6. Grade taught: Kdgn. 1 2 3 4 5 6

DIRECTIONS

This is not a test but an instrument designed to measure the meanings of certain concepts to various people. There are no right or wrong answers; however, it is important that your responses accurately reflect your own feelings.

At the top of each page in this booklet is a concept in bold type. Below each concept is a series of thirteen descriptive-adjective scales, such as the one which appears below:

PARENTS

severe :___:___:___:___:___:___:___: lenient

Note: The concept and scale above and description below are used for explanatory purposes only.

Keeping the concept clearly in mind as you work, here is how you use the scales. An (X) toward the left of the scale indicates that you judge the concept to be more "severe" than "lenient". Successive units toward the left indicate the degree of severity. Similarly, an (X) to the right of the scale reflects a judgment of "lenient" with successive units to the right of the scale indicating greater degrees of leniency.

You are to rate each scale in order. Do not skip around, and do not leave any scales blank. Sometimes you may feel as though you have responded to the same item previously. This will not be the case, so do not look back and forth through the items. Do not spend too much time deliberating on any one item, but try to give your first impression and work rapidly. You should place your (X) in the middle of the spaces (:_X_:___:), and not on the boundaries (:___X___:).

We are interested in your own honest feelings. Keep in mind that you should respond to each concept as you perceive it at this time, and not as you think it could or should be. When you have completed all of the scales on a page, and only then, go on to the next page.

VOCATIONAL EDUCATION

narrow	:___:___:___:___:___:___:___:	wide
untimely	:___:___:___:___:___:___:___:	timely
cold	:___:___:___:___:___:___:___:	hot
strong	:___:___:___:___:___:___:___:	weak
important	:___:___:___:___:___:___:___:	unimportant
worthless	:___:___:___:___:___:___:___:	valuable
deep	:___:___:___:___:___:___:___:	shallow
fresh	:___:___:___:___:___:___:___:	stale
sharp	:___:___:___:___:___:___:___:	dull
bad	:___:___:___:___:___:___:___:	good
passive	:___:___:___:___:___:___:___:	active
unpleasant	:___:___:___:___:___:___:___:	pleasant
unsuccessful	:___:___:___:___:___:___:___:	successful

CAREER EDUCATION

unpleasant	:___:___:___:___:___:___:___:	pleasant
passive	:___:___:___:___:___:___:___:	active
bad	:___:___:___:___:___:___:___:	good
weak	:___:___:___:___:___:___:___:	strong
narrow	:___:___:___:___:___:___:___:	wide
hot	:___:___:___:___:___:___:___:	cold
unimportant	:___:___:___:___:___:___:___:	important
worthless	:___:___:___:___:___:___:___:	valuable
untimely	:___:___:___:___:___:___:___:	timely
fresh	:___:___:___:___:___:___:___:	stale
sharp	:___:___:___:___:___:___:___:	dull
deep	:___:___:___:___:___:___:___:	shallow
unsuccessful	:___:___:___:___:___:___:___:	successful

INDUSTRIAL ARTS

good	:____:____:____:____:____:____:____:	bad
passive	:____:____:____:____:____:____:____:	active
dull	:____:____:____:____:____:____:____:	sharp
wide	:____:____:____:____:____:____:____:	narrow
timely	:____:____:____:____:____:____:____:	untimely
deep	:____:____:____:____:____:____:____:	shallow
successful	:____:____:____:____:____:____:____:	unsuccessful
stale	:____:____:____:____:____:____:____:	fresh
cold	:____:____:____:____:____:____:____:	hot
weak	:____:____:____:____:____:____:____:	strong
pleasant	:____:____:____:____:____:____:____:	unpleasant
important	:____:____:____:____:____:____:____:	unimportant
worthless	:____:____:____:____:____:____:____:	valuable

APPENDIX B

TABLES 22-29

TABLE 22

PRETEST-POSTTEST MEAN SCORE DIFFERENCES OF SUBJECTS BY COMPARISON GROUP

Concept	Group	Factor	Trial Means		Statistical Value--t	Probability	No. of Valid Observations	Degrees of Freedom	
			Pretest	Posttest				Trials	Error
Vocational Education	Exp.	Evaluative	37.88	38.21	0.496	.6269	96	1	95
		Potency	13.24	13.85	1.415	.1567			
		Activity	14.31	14.83	1.526	.1263			
		Total Concept	65.43	66.90	1.064	.2899			
	Control	Evaluative	38.71	37.25	-1.794	.0724	95	1	94
		Potency	13.56	13.00	-1.126	.2622			
		Activity	14.69	13.99	-1.628	.1029			
		Total Concept	66.96	64.24	-1.851	.0639			
Career Education	Exp.	Evaluative	37.30	37.25	-0.077	.9382	96	1	95
		Potency	14.24	14.42	0.469	.6456			
		Activity	14.24	14.19	-0.141	.8826			
		Total Concept	65.78	65.85	0.077	.9369			
	Control	Evaluative	37.74	37.04	-0.930	.6427	95	1	94
		Potency	14.38	14.08	-0.786	.5601			
		Activity	14.19	14.24	-0.145	.8785			
		Total Concept	66.31	65.37	-0.855	.6008			

TABLE 22 (continued)

Concept	Group	Factor	Trial Means		Statistical Value--t	Probability	No. of Valid Observations	Degrees of Freedom	
			Pretest	Posttest				Trials	Error
Industrial Arts	Exp.	Evaluative	37.13	38.20	1.654	.0976	95	1	94
		Potency	13.99	14.85	2.773	.0068			
		Activity	14.89	15.54	2.204	.0281			
		Total Concept	66.01	68.59	2.425	.0164			
	Control	Evaluative	36.15	36.88	0.992	.6754	91	1	90
		Potency	13.58	13.94	0.993	.6761			
		Activity	14.67	14.99	0.965	.6611			
		Total Concept	64.41	65.81	1.140	.2561			

TABLE 23

MEAN SCORE DIFFERENCES OF
COMPARISON GROUPS

Concept	Trial	Factor	Group Means		Statistical Value	Probability	No. of Valid Observations		Degrees of Freedom	
			Exp.	Control	F		Exp.	Control	Groups	Error
Vocational Education	Pretest	Evaluative	37.74	38.62	0.925	.6610	99	100	1	197
		Potency	13.24	13.51	0.262	.6653				
		Activity	14.31	14.67	0.640	.5695				
		Total Concept	65.29	66.80	0.723	.5991				
	Posttest	Evaluative	38.27	37.25	1.167	.2810	97	95	1	190
		Potency	13.90	13.00	2.555	.1075				
		Activity	14.87	13.99	3.578	.0568				
		Total Concept	67.03	64.24	2.591	.1051				
Career Education	Pretest	Evaluative	37.32	37.89	0.340	.5678	98	98	1	194
		Potency	14.25	14.50	0.259	.6176				
		Activity	14.28	14.27	0.000	.9819				
		Total Concept	65.84	66.65	0.207	.6548				
	Posttest	Evaluative	37.31	37.13	0.028	.8613	98	97	1	193
		Potency	14.42	14.14	0.293	.5959				
		Activity	14.14	14.32	0.138	.7124				
		Total Concept	65.87	65.60	0.048	.8221				

TABLE 23 (continued)

Concept	Trial	Factor	Group Means		Statistical Value	Probability	No. of Valid Observations		Degrees of Freedom	
			Exp.	Control	F		Exp.	Control	Groups	Error
Industrial Arts	Pretest	Evaluative	37.02	36.16	0.874	.6467	98	97	1	193
		Potency	13.98	13.51	1.036	.3109				
		Activity	14.86	14.64	0.283	.6019				
		Total Concept	65.86	64.31	0.788	.6207				
	Posttest	Evaluative	38.29	36.69	3.013	.0804	97	93	1	188
		Potency	14.90	13.84	4.491	.0332				
		Activity	15.52	14.90	1.884	.1680				
		Total Concept	68.70	65.43	3.668	.0538				

TABLE 24

MEAN SCORE DIFFERENCES OF
MALE VS. FEMALE

Concepts	Factor	Group Means		Statistical Value	Probability
		Male (N=46)	Female (N=154)	F	
Vocational Education	Evaluative	38.58	38.06	0.218	.6465
	Potency	13.78	13.26	0.690	.5879
	Activity	15.27	14.27	3.571	.0570
	Total	67.62	65.59	0.968	.6726
Career Education	Evaluative	37.62	37.00	5.188	.0224
	Potency	15.13	14.15	2.782	.0929
	Activity	15.40	13.93	6.216	.0129
	Total	70.16	65.08	5.428	.0197
Industrial Arts	Evaluative	38.84	35.96	7.013	.0086
	Potency	14.67	13.48	4.595	.0312
	Activity	15.58	14.51	4.786	.0280
	Total	69.09	63.95	7.016	.0086

TABLE 25

MEAN SCORE DIFFERENCES OF GROUPS BY
GRADE TAUGHT (PRETEST)

Concepts	Factor	Group Means							Statistical Value--F	Probability
		Kdgn.	1	2	3	4	5	6		
Vocational Education	Evaluative	38.29	37.16	38.55	37.53	40.46	37.13	38.78	0.974	.5549
	Potency	13.24	13.14	13.42	13.00	14.32	12.81	13.96	0.608	.7261
	Activity	14.06	14.38	14.39	14.47	15.21	13.97	15.00	0.550	.7713
	Total	65.59	64.68	66.35	65.00	70.00	63.90	67.74	0.852	.5325
Career Education	Evaluative	36.75	37.27	36.03	37.90	40.68	35.87	38.96	1.791	.1022
	Potency	13.69	14.24	14.00	14.58	15.61	13.63	14.74	1.033	.4057
	Activity	13.25	14.24	13.42	14.68	15.46	13.53	15.13	1.621	.1426
	Total	63.69	65.76	63.45	67.16	71.75	63.03	68.83	1.721	.1173
Industrial Arts	Evaluative	36.76	34.19	36.30	36.19	38.79	35.93	39.43	2.364	.0314
	Potency	13.41	12.95	13.77	13.19	14.68	13.14	15.61	2.466	.0253
	Activity	14.76	14.16	14.40	14.58	15.61	14.14	16.08	1.890	.0839
	Total	64.94	61.30	64.47	63.97	69.07	63.21	71.13	2.683	.0160

TABLE 26

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF SUBJECTS BY TEACHING EXPERIENCE CATEGORIES (PRETEST)

Concepts	Group Means									Statistical Value
	0	1	2	3	4	5-9	10-15	15-19	20 or more yrs.	*F*
Vocational Education	68.21	66.00	67.44	64.87	63.91	68.16	64.64	66.33	62.81	0.572
Career Education	71.42	65.79	65.61	65.14	63.50	66.76	63.70	68.48	64.90	0.687
Industrial Arts	63.76	66.38	66.39	61.00	61.00	66.22	65.75	67.38	63.00	0.700
N =	20	29	18	15	11	37	28	21	21	

Note: None of the *F* ratios above were significant at the .05 level

TABLE 27

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF SUBJECTS BY WORK EXPERIENCE CATEGORIES (PRETEST)

Concepts	Group Means									Statistical Value
	0	1	2	3	4	5-9	10-15	15-19	20 or more yrs.	F
Vocational Education	68.03	66.76	64.75	64.00	63.61	66.59	67.41	67.33	62.78	0.460
Career Education	65.87	64.00	61.81	67.08	66.06	66.38	71.14	65.83	70.00	0.814
Industrial Arts	63.71	60.71	60.07	64.08	66.58	67.15	69.05	68.00	62.56	1.340
N =	32	17	16	12	31	39	22	6	9	

Note: None of the F ratios above were significant at the .05 level

TABLE 28

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF SUBJECTS BY AGE BRACKETS (PRETEST)

Concepts	Group Means					Statistical Value F
	Below 30	30-39	40-49	50-59	60 and above	
Vocational Education	67.83	63.27	63.69	69.26	61.82	2.373
Career Education	66.48	63.77	66.94	69.00	63.36	0.884
Industrial Arts	64.46	65.28	65.08	66.81	64.09	0.291
N =	81	41	35	32	11	

Note: None of the F ratios above were significant at the .05 level

TABLE 29

MEAN TOTAL CONCEPT SCORE DIFFERENCES OF SUBJECTS BY DEGREE HELD--UNDERGRADUATE, GRADUATE (PRETEST)

Concepts	Group Means		Statistical Value F
	Undergraduate (N=71)	Graduate (N=129)	
Vocational Education	66.79	65.65	0.486
Career Education	66.47	66.13	0.027
Industrial Arts	65.75	64.72	0.401

Note: None of the F ratios above were significant at the .05 level

BIOGRAPHICAL SKETCH

William Frank Smith was born in McKinney, Texas, on October 16, 1943. He received his elementary and secondary education in the McKinney Public Schools. In 1962, he entered North Texas State University, graduating in 1965 with a Bachelor of Science degree. While pursuing his undergraduate degree, he received the Blackburn Award as outstanding industrial arts student. After teaching for three years in the Dallas Public Schools, Dallas, Texas, he completed the requirements for the Master of Education at North Texas State University. After receiving his masters degree in 1968, he joined the faculty of the Department of Engineering Technology at Texas A & M University where he taught electronics for three years. He entered full-time study at Arizona State University in June, 1971, in pursuit of the Doctor of Education degree. During the 1972-73 school year,. he served an administrative internship as Coordinator of Staff Development at the Center for Career Development, Mesa Public Schools, Mesa, Arizona. He is a member of Phi Delta Kappa and Iota Lambda Sigma honor societies. He is married and the father of two sons.